RAILROAD GAZETTE

FRIDAY, DECEMBER 17, 1897.

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Contributions.

The Engineer of the Nicaragua Canal Commission.

CHICAGO, Dec. 13, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My attention is called to a paragraph of page 875 of last week's *Railroad Gazette* regarding the Nicaragua Canal Commission. Mr. E. S. Wheeler *is* the Chief Engineer of the Commission, and he sailed in the Newport, and will have charge of all surveys, with the exception, probably, of the hydrographic surveys of the harbors of Lake Nicaragua and the San Juan River. These are to be made by naval officers, and it is not likely that a civilian will be put in charge of this work. However, Mr. Wheeler will have charge of all the land surveys, borings and the collection of data concerning rainfalls etc. The affairs of this Commission are pretty badly mixed, but there can be no doubt that Mr. Wheeler sailed with the party. W.

Fogs and the Tunnel Road

BROOKLYN, Dec. 14.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Permit me to thank you for having called my attention to the paragraph printed in your issue of December 10, entitled "A Foggy Editor."

I fancy that the editor is not only "foggy," but "foxy." In the evening of the day in which my communication relating to "underground fogs" was printed in *The Sun*, there appeared in *The Evening Post* an editorial referring to underground transit, in which it was stated: "The opponents of underground transit have discovered another tremendous obstacle to the movement of trains in a tunnel. . . . Now a fog is cited as constituting 'under certain atmospheric conditions' a barrier which might block the entire system."

You will notice that the editor had not the courtesy to publish my communication to which this marked reference is made; if he had so done, the statement and counter-statement would have been presented to the public, and the strength of his position or mine could have been judged thereby.

I am amused that he should quote me as an "opponent" of underground transit. So far, I have not anywhere publicly expressed my opinion. It, however, is not too late; such would be a most futile undertaking for the relief of crowded traffic of the busy hours in New York, promoted by those who are personal opponents to the present elevated railroad systems; by those who are interested in securing large contracts from the city, and honestly and earnestly by those, and evidently a large number of citizens, ill advised as to the utility of the plans noted. That it would be, and surely within the lifetime of the present generation, a failure—either as a means of transit or as a financial investment—I have no doubt. G. LEVERICH.

Heavy Rails and Smooth Track.

CHICAGO, Dec. 11, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Chief Engineer," who writes in the *Railroad Gazette* of Dec. 3, is right in one respect, that the light rail will ride softer and with less noise than a heavy rail, but nevertheless it is absolutely necessary to have the heavy rail, and the light rail therefore drops out of the question. We have run the ordinary coaches of to-day and the ordinary engines (not the experimental heavy ones), over 45-lb. rail, with gravel and cinder ballast, and they moved along with very little noise indeed. The rails were bent and the track poor, but it carried the train. Even after these rails were reduced to a much lighter section (we have known some of them to reduce to 30 lbs. per yard) they still carried the trains, but of course necessitated slow speed, which is not an economical or proper thing to do from an operating standpoint.

I am a great believer in elastic track, but of course it can be carried to an extreme; for instance, if a rail bends and the roadbed is soft it makes an elastic track, but an engine cannot haul as many cars on it as when the track is more rigid. The elastic track is one of the main features in adhering to the wooden cross-tie instead of the metal one. The cross-tie, while it is not as permanent as we would like to have it, is a very essential part of the track, forming a cushion for the rail, giving elasticity, which saves wear and tear on the rail as well as on the cars and motive power. Going back to the early construction of railroads, the rail was placed on stone sleepers, in size about equal to a large cross-tie, or on stone blocks, which were found to be so rigid that the rail would batter out, and it was never a very good track for operation. Following this came the wooden cross-ties, which were used as an emergency where stone blocks could not be secured, and proved to be such a fortunate discovery that they were adopted generally and the stone cross-ties abandoned.

ENGINEER MAINTENANCE OF WAY.

[But the track with stone sleepers was hard in spots and soft between. The only kind of "rigid" track that could possibly be acceptable must be rigid all the way—viz., rails of stiff section on ties of adequate bearing surface, well balasted. Such a track would be, we conceive, easiest to haul over, easiest to ride over and cheapest to maintain, if the rolling stock has proper springs. Is this true or not? We think so, but are "open to conviction."—EDITOR RAILROAD GARETTE.]

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your remarks in issue of the 3d, relating to the "Riding of Cars on the Modern Stiff Track," an experience of the writer may be of interest. Some years ago I was connected with a railroad with single track. The rails were chair pattern, 56 lbs. to the yard. The road was gravel ballasted. When the rails were worn, it was decided to replace them with 65-lb. rails, with fish plates. There was a heavy and ruling grade on one of the divisions, on which there was much trouble from trains stalling and loosing time. A side track had been put in at the summit to haul trains to in sections that stalled on the grade. It was determined to relay this grade with the new and heavier rails first.

The locomotive equipment was light, as were the cars, the box-cars being 28 ft. long, 18,000 lbs. capacity. New box-cars had been ordered 30 ft. long and 80,000 lbs. capacity; the delivery of these new cars commenced about the time the grade was replaid with new rails and track put in good shape. The question then came up if the engines could haul the same number of the new and heavier cars in a train over the grade, or if the number of cars per train would have to be reduced. It was finally decided to make no change and watch results.

Much to the surprise of all, the same engines not only hauled the same number of the new cars, but did it without any trouble or delay. An investigation was in order, and it was found that on the old 56-lb. rail, in hauling loaded cars over it, the rails sprang down under the weight at each truck; the result was that each truck was being hauled up-grade to the extent of the depression of the rails in addition to the grade of the track. With the new and stiffer rails secured by fish plates, the rails were so rigid that the cars were hauled over them with less resistance. * * *

[Is it correct to say that each truck was being hauled up-grade to the extent of the depression of the track? What becomes of the reaction of the rail? Some of the work of bending must come back as useful work.—EDITOR RAILROAD GAZETTE.]

The Report of the Signal Committee of the American Railway Association.

EASTON, Pa., Nov. 12, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your editorial on the report of the Signal Committee of the American Railway Association on page 726 of your issue of Oct. 15, 1897, while we are in no way authorized to speak for this committee, we believe that its members had a thorough knowledge of the present practice of installing electric locking. I refer more especially now to your remarks on the first and fourteenth rules under "requisites of installation," and we quote from your editorial as follows:

"But we are surprised to find the very first requisite for installation is a higher standard than is in force on any railroad in the world. . . . This requisite is that signals must be so interlocked that they cannot be pulled to the go-ahead position unless the track controlled by the signal is clear. . . . But when we come to the fourteenth we find a principle which all the signal engineers we know of declare to be positively vicious, that of locking a signal in the clear position. A clear distant signal may well be so arranged that a train passing it can lock its own switches, and all the signals and other fixtures designed to keep other trains out of its way, but its own home signal is not one of these. That should always be at the service of the signalman to use for stopping a train in an emergency."

As we interpret the first rule under the head of "requisites for installation" it simply requires that before a clear signal can be given, all switches must be set and locked for the route governed by that signal, and that all opposing routes and the signals indicating them shall be so set and locked either through the mechanism of the interlocking machine alone or through the mechanism of the interlocking machine and the arrangement of connections on the ground that their position and indication do not conflict with the clear signal and the route governed by it. There seems to be no intimation in this rule that electric locking as indicated by your editorial is to be required. The word "clear" is manifestly used with the intention that the switches on any specific route must be set for that route and locked so that the route is clear before the signal which governs that route can be cleared or placed in the advance position.

We presume that you have interpreted the word "clear" to mean that after the route had been set up and the clear position of the signal indicated and a train had accepted the clear signal and had entered upon the route indicated by such clear signal, no second train could be admitted to that route until the first train had passed over and beyond the point indicated and governed by the said clear signal. We believe this is not the proper interpretation of the word "clear" as used in connection with the first rule for such interpretation would more properly apply to block signaling.

In your editorial you say, "This must mean electric locking" We do not understand how electric locking would prevent a second train from following the first as the function of electric locking is to insure that when a clear signal is given the operator cannot change the route until the train has released him by having accepted the signal and passed over and beyond the point controlled by it, excepting, however, in case he finds it necessary to change the route after the signal has been cleared and before it has been accepted by a train, in which case he is authorized to do so as explained in the article in your issue of September 10 under the title of "Electric Locks for Derails at Crossings." If the committee had intended to interpret the word "clear" to mean that after the first train had accepted the signal it would automatically go to danger so as not to leave a clear signal for a second train following, they would have further stated that the home and distant signal should be equipped with an electric slot so connected with the rails that each signal would automatically go to danger after the passage of the first pair of wheels beyond it and remain at danger beyond the control of the operator to clear it until the train had passed over and beyond the point these signals govern.

It is not within the province, however, of the ordinary interlocking plant to control the movement of trains by a block system, and the proper function of the home signal in an interlocking plant is that its clear position cannot be displayed unless the route which it governs is continuous and is fully protected against conflicting routes. The present system of electric locking was fully explained in your issue of the 10th before referred to. The old practice of carrying the rail circuit to the distant signal, as suggested by you, has been abandoned for the new system which has the circuit between the derails only, and is so designed that when the home signal is cleared the derails on the route governed by that home signal cannot be changed until the train has moved beyond the point governed by that signal. The home signal, however, can be put to danger at any time after it has once been cleared, but the putting of the signal to danger does not allow the operator to open the derail. This then seems to answer your objection to rule No. 14, and we believe this to be one of the most important rules formulated by the committee.

We are constantly reminded of the necessity of arranging interlocking plants at grade crossings so that the operator cannot open a derail immediately in front of a train moving at high speed. It was only three weeks after the adoption of this rule by the Association that an accident occurred in Indiana which would have been prevented if the plant had been installed in accordance with the requirements as indicated by the report of the Signal Committee. It was reported in that case that the engineer had been given a clear signal and his train had arrived to within a short distance of the derail when for some cause the operator decided to change the indication of the signals and the condition of the track and opened the derail in front of him, with the result that a considerable portion of his train was derailed and destroyed and his own life offered up as a sacrifice.

Referring to the last paragraph of rule No. 14, "Where distant signals are used the display of a clear distant signal shall lock the home signal in the clear position," and to your editorial where you say, "We congratulate the Association on setting for itself such a high standard, but the rule seems pretty radical when you consider that in the same code distant signals, needed by the score or hundred on nearly every large road are not even recommended; they are described as adjuncts which *may* be used if desired." We believe that there are many cases in interlocking plants where distant signals are not desirable or necessary, and that they never should be put in without electric locking In the case of block signals the distant signals must be considered from an entirely different point of view, but the report of the committee seems to be confined strictly to interlocking plants, and consequently it would not have been advisable for it to rec

ommend the installation of distant signals as an absolute requirement at all points. There are many interlocking plants in cities where high speed is not possible and would not be permitted if it were possible.

It seems to us that the committee who represent an association composed of officials charged with the duty of conducting the business of the several railroads they represent in such a manner as to protect and preserve the lives of passengers submitted to their care and at the same time facilitate the movement of traffic, have very clearly expressed their desire to fulfill their obligations to the public and the property in their charge in the report which was adopted by the association; and, since it is proper and necessary to enforce rules requiring the engineer to observe the position of all signals and be guided by their indication, it is equally necessary that the installation of any signal shall be such and its operation so controlled that the engineer in approaching same may have absolute assurance that he is authorized to accept and act upon its indication.

Charles Hansel, *M. Am. Soc. C. E.*

[Mr. Hansell's letter is interesting, but so far as it concerns our criticisms of the interlocking rules of the American Railway Association it is quite superfluous. We found fault with the use of the word clear in the first requisite, and we said that the provision that the distant signal clear shall lock the home signal clear, is wrong, in fact that all signal engineers would call it absolutely vicious. In both criticisms we were wrong, and it requires little reflection and but little knowledge of signaling to see that. For the first there is a shadow of excuse. The committee might have been more explicit; but at the head of the rules is the information that they are for *interlocking*. Hence, by exclusion, they are not for block signaling. For the other statement there was no excuse whatever. As much as 18 years ago, in the very dawn of the interlocking art in this country, the principle laid down by the committee was hammered into the head of the present editor of the *Railroad Gazette* and has had pretty firm lodgement there ever since. We conclude that this accident must be put under the class of those due to negligence in operation. We have ascertained that the engineer was lighting his pipe when he passed the signal, and the fireman was taking a short nap.—Editor Railroad Gazette.]

Handling Freight Trains Partially Equipped with Air.

Blue Island, Ill., Dec. 11, 1897.

To the Editor of the Railroad Gazette:

Referring to the editorials in the *Railroad Gazette* of Nov. 19 and in the November issue of the *Railway Master Mechanic*, in which both take exceptions to the manner in which this question is handled by the Rock Island system, I wish it to be understood that the practice as outlined in my paper does not apply to the Illinois division of the C., R. I. & P. only, but to the entire system of almost 4,000 miles. The maximum grade of the Illinois division is about five-tenths of one per cent., the Southwestern division, 85 ft.; all other divisions, one per cent. The grade is rolling, especially so through Iowa, Missouri, Nebraska and Northern Kansas, the road being up hill and down and full of curves. On the Western Division, or Colorado end, many of our grades are 5 to 16 miles in length. Prior to September, 1896, the accidents resulting from trains partially equipped with air-brakes breaking in two and running together were of such proportions that the management concluded that the men were either careless or that our rules were not right. At that time we were working under the following rule:

"When freight trains are running with not more than one-half of train equipped with working air-brakes such trains must be held on descending grains from the rear end by hand-brakes; also when approaching stations or other stops (except emergency cases) the slack must be kept out of trains by use of hand brakes; that is to say, brakes shall be set on the rear sufficiently to avoid the slack running up when application of air may be made by the engineman. Enginemen must use the greatest care in applying air-brakes to prevent unnecessary jerking of train, breaking in two, etc. When train is all, *or more than half, equipped with air-brakes in working order the engineman will control its movements with air-brakes.*"

This rule was in force for some five years, and seemed to be a step in the right direction, but our accidents did not cease. Investigations brought out the fact that the trainmen and enginemen were carrying out the instructions contained in the rule. It was argued by some that the braking by hand should commence next behind the last air car, the argument being that, by holding a train from the rear, links, pins and drawbars would be broken and pulled out. After inquiry among other roads to see what our neighbors were doing and what the results were it was decided to make a series of tests to see what was needed to put a stop to the evil from trains partially equipped with air breaking in two and running together. It was agreed that if all freight cars were equipped with air there would be no need of any argument. These tests were made first on one division and then on another, beginning with the divisions of lower grades and straight track, and ending with divisions with heavier grades and crooked track. The results showed that by holding trains from the rear, as prescribed in our rule 587, the correct course had been pursued. We had not prior to the adoption of this rule kept a record of all cases of break-in-two, showing their cause, etc., but had a record showing cases of trains breaking in two and parts colliding. The following statement speaks for itself:

Statement showing number of trains breaking in two during the months of September and October 1896 and 1897.

	Number of trains breaking in two.		Decrease.	Per cent. decrease.	Total number of trains run.		Increase.	Per cent. increase.	Per cent. of breaks to total trains run.	
	1896	1857			1896	1897			1896	1897
Sept.....	220	57	163	74.09	7,411	8,337	923	12.45	2.97	0.68
Oct.....	156	55	101	64.74	8,810	9,048	238	2.70	1.77	0.61
Total....	376	112	264	70.21	16,224	17,385	1,161	7.15	2.32	0.64

This covers the first two months of the first and second years of operation of the rules relative to handling of part air-brake trains, now in effect.

Total number of trains broken apart and the parts colliding for the entire system during the year ending Sept. 1, 1896.....	24
For the year ending Sept. 1, 1897, but one case occurred of train parting followed by collision of the parts.....	1
Per cent. of decrea e in year ending Sept. 1, 1897.....	95.83

It will be noted that in September and October, 1896 the first two months after the adoption of this rule there were 376 trains which broke in two, while during the same months in 1897, one year after the rule had been put in force, 112 trains thus broke, showing a decrease of 70.21 per cent. During the same period in 1896 the percentage of the break-in-twos to total number of trains run was 2.32 per cent., while in 1897 this percentage was but 0.64 of one per cent., a decrease of 1.68, notwithstanding 1,161 more trains were run during the two months of 1897 than during the same months in 1896. The figures given are correct, and show that we have accomplished the desired result. This result has been obtained with practically the same force of men, we having employed but few new men, and those only during the heavy grain movement in August, 1897.

Quoting the *Railway Master Mechanic*: "Supposing that, in accordance with the suggestions made, the slack be held out by a few hand brakes set on the rear end, the engineer makes an application with air-brakes of the forward cars, if these are of any considerable number the forward end would be much more heavily braked than the rear end, and the slack between would run in with considerable violence. How much more violently would the slack run in if there were no brakes on the rear end?" From tests made I can answer this by saying that without rear brakes set the shock was sufficient to knock a man down who was not looking for it, while with the rear hand brakes set the shock was hardly perceptible.

Referring to the argument that with the brakes set on the rear the engineman waits a very long time until the hand brakes are released, we find that we are not experiencing any delays by reason of this. It takes a brakeman but a short time to release the brakes. It would seem that it is the opinion that all, or the greater part, of the hand brakes must be set. This is not the case, as on a piece of track of one per cent. grade it has been demonstrated that with a train of 50 loads five hand brakes hold the slack out sufficiently.

Relative to pulling the train in two by reason of the hand brakes being set on the rear and the engineman not waiting until they are released, while we have had one or two cases of this kind it has been shown that in each case the engineman handled the train roughly. This can be avoided by giving trainmen time to release the brakes, and by starting the train slowly and not with a jerk, which should be done in all cases. The results obtained by the brakemen giving the engineman the slack of his train to enable him to start at a hard pull are identically the same. It is not argued that with a few hand brakes set on the rear of a long train there will be no slack to the same when the air is applied to the forward portion, but it is claimed that it will lessen the shock sufficiently so that the results at the rear end will not be of a disastrous character, such as piling and breaking freight in the cars, breaking draw-gears, throwing the trainmen off their feet, etc. This rule, as stated before, was adopted for the purpose of preventing a collision between the parts of a train broken in two.

With reference to the inquiry as to why a few hand brakes set on the first few of the non-air cars next behind the air cannot be applied just as well as to have this rule applied, we have had many cases of trains parting on descending grade under conditions of weather of such nature that no one had knowl edge that the train had parted, and yet but one case of parts colliding since the adoption of this rule. Taking the argument of the editor as to the proper manner of holding a train going down grade, and the necessity arising for the engineman to apply the emergency, it is not necessary for me to state what the results would be under conditions as above stated. With a sufficient number of hand brakes set on the rear of the train the chances are, under precisely the same circumstances, that while the two parts may collide the shock will not be of sufficient force to do any damage further than the breaking of a few drawbars.

With reference to that part of the editorial in the *Railroad Gazette* which reads, "That the rules have worked well on Mr. Nichols' division is not in itself sufficient to guarantee their successful application on other roads. Whether it is a personal element on the C., R. I. & P.," etc. In the paper which the editor is criticising, this statement is made, "It might be interesting to follow the course of the management of the C., R. I. & P. in their investigation of this subject as tending to show the foundation for the theory of those who believe in braking behind." It was thought this was plain enough to have all understand that the rule applied not only to the Illinois division but to the entire system.

In regard to cutting out air-brakes in good working order in a train of less than one-half of air-brake cars, in order to make air-brake cars thus cut out available for hand brakes, and thereby get sufficient power to control the train by hand brakes, and answering the question "What do we do with the slack on a fully equipped air-brake train, and why does he not try to stretch it, too, by hand brakes at the rear end?" The editor has either mis quoted or misunderstood that part of the paper. It reads, "In case the make-up of the train was such that the non-air cars were insufficient to hold the whole train, air cars were cut out, beginning at the rear, until power enough was available under hand brakes." In case the train is equipped with only one-half air-brakes in working order it is safe to assume that there would be a sufficient number of non-air cars to control the movement of the train. In case, however, the train consisted of 30 cars all told, 29 air-brakes, under our ruling we would cut out a sufficient number of air-brake cars beginning at the rear until we did have a sufficient number of hand brakes to control the movement of the train. In case the train is all air it would all be used and the enginemen held responsible for the movement of the train.

The allusion to the danger from trains parting among the air cars had an exemplification within my knowledge at a not very remote date. A train of 61 cars, 23 air, was ascending a grade at a speed of 10 miles an hour, when an air hose burst. The air cars stopped at once, but the 38 non-air cars came up with such force as to throw several of the weakest and lightest cars behind the air to either side. Had this train been on a descending grade with sufficient hand-brakes set at the rear this wreck would not have occurred. The conditions in this case were sufficiently similar to a case of train parting among the air to show what the result would be both to the air cars and to the non-air. Bear in mind the disastrous consequences followed in spite of the slow speed and of an ascending grade. How much worse they would have been on level track at greater speed, or on a descending grade, with no retarding force at the rear, who can tell?

C. L. Nichols,
Supt. Illinois Division C., R. I. & P.

Fast Runs on the Union Pacific.

Since the fast run of 519 miles over the Union Pacific, reported in our issue of Dec. 3, page 857, the trains of that road have broken their own record two or three times. On Dec. 4 the fast mail, which, as in the previous case, had been detained at Wyoming, was run from Sidney to Grand Island, 261 miles, in 238 minutes or at the rate of 65.6 miles an hour. From Kearney to Grand Island, 42 miles, the time was 36 minutes, equal to 70 miles an hour. On the following day a special train carrying a theatrical company was run from North Platte to Council Bluffs, 294 miles, in 286 minutes. This train was delayed at the crossing at Portal, and this, with the regular stops, brings the net running time down to 275 minutes, making the rate of speed while in motion 64.1 miles an hour.

On Dec 10 the fast mail was run from Cheyenne to North Platte, 225 miles, in 214 minutes, equal to 63.1 miles an hour. On the first stage of the journey, Cheyenne to Sidney, 102 miles, the time was 97 minutes; the second stage, Sidney to North Platte, 123 miles, took 117 minutes.

From the table given in the *Official Guide* it appears that the elevation of Cheyenne is 6,050 ft. above the level of the sea; from thence the fall to Sidney is 1,960 ft. and to North Platte, 3,254 ft. From North Platte to Council Bluffs the fall is 1,816 ft.

On the long distance run previously reported (Dec. 3) the time through, 559 minutes, was 32.47 per cent. less than the schedule time.

The engines used on these fast trains of the Union Pacific are of three classes, (1) American type, four drivers connected, with 19 in. × 24 in. cylinders; (2) American type with 18 in. × 26 in. cylinders; and (3) 10-wheel with cylinders 20 in. × 24 in. The dimensions of the first named type were given in the *Railroad Gazette* of Oct. 22 last, page 744. The principal dimensions of this and other two types are as below:

DIMENSIONS OF UNION PACIFIC LOCOMOTIVES.

	Engine Numbers.		
	1813	811 and 816	890
Type	10-wheel	8-wheel	8 wheel
Cylinders, diameter....in.	20	18	19
" stroke....in.	24	26	24
Steam ports....in. × in.	17 × 1½	16 × 1¼	17 × 1½
Exhaust....in. × in.	17 × 3	16 × 2⅛	17 × 3
Travel of valve....in.	5½	5¼	5¾
Lap of valve....in.	⅞	⅞	⅞
Lead in full gear....in.	1/16	1/16	1/16
Diam. driving-wheels....in.	69	69	69
Driving-axle journals....in.	8 × 11	8 × 11¼	8 × 11¼
Truck-axle journals....in.	5½ × 10	5½ × 10	5½ × 10
Firebox, length inside....in.	108	72¼	96
Firebox, width inside....in.	32¾	33⅜	34¼
Heating surface....sq. ft.	1,958.50	1,347.6	1,688.9
Grate area....sq. ft.	24.56	16.71	22.8
Weight of engine....lbs.	131,200	107,000	119,600
Weight on drivers....lbs.	103,100	69 300	81,025
Weight of tender empty.lbs.	45,900	45,900	45,900
Capacity coal....lbs.	28,000	28,000	28,000
" water....gals.	4,000	4,000	4,000

New Experimental Locomotive "Schenectady No 2," Purdue University.

The new experimental locomotive, which we illustrate in this issue, was built by the Schenectady Locomotive Works, and recently delivered at the locomotive testing plant of Purdue University, La Fayette, Ind. The engine will be known as Schenectady No. 2, and is of the American eight-wheel type. The general characteristics of an engine which would meet the requirements of the laboratory were furnished by Professor W. F. M. Goss to the builders, who in turn determined the details. At the time the order was given to build this locomotive we described briefly its chief peculiarities, which consist of duplicate cylinders with a saddle arrangement such that the engine may be used either as a simple or a compound locomotive; the boiler, also, is capable of carrying a much higher steam pressure than is now used in American practice. The total weight of the engine in working order is 104,500 lbs., 64,000 lbs. being carried on the drivers and 40,500 lbs. on the truck wheels. There is no tender. The total wheel base is 23 ft. 6 in. long, the driving-wheel base 8 ft. 6 in., and the length over all 32 ft. 4⅜ in.

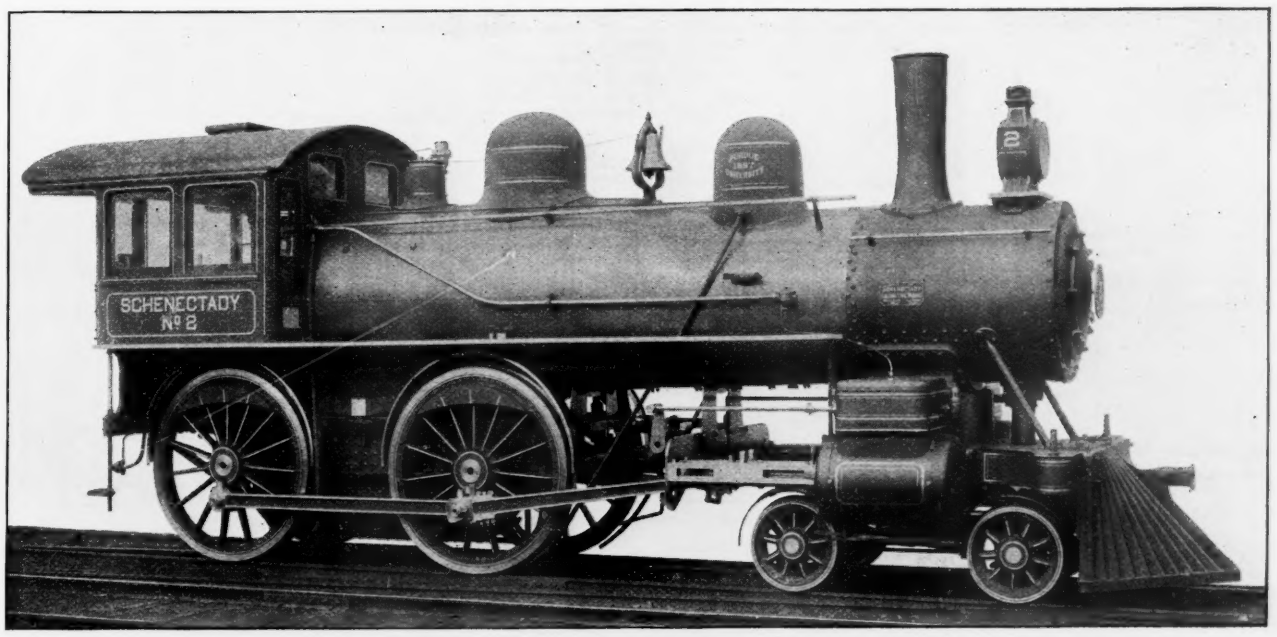


Fig. 1.—Experimental Locomotive for Purdue University.

Built by the SCHENECTADY LOCOMOTIVE WORKS, *Schenectady, N. Y.*

The driving wheels, 69 in. in diameter, have centers of cast steel; the tires are 3 in. thick, held by shrinkage and retaining rings, and are turned flat on the tread to correspond to the faces of the supporting wheels of the testing plant. The driving axles are hollow, nickel-steel forgings, with journals 7½ in. in diameter by 8½ in. long, while the driving boxes are steeled cast iron with heavy Ajax metal bearings and large oil cellars. The eccentrics are secured to the axle by steel set screws, and no keys are used.

The main frames are of cast steel, 4 in. wide, while the front rails are of hammered iron. The engine truck has a square, wrought-iron frame, cast-iron pedestals, center bearing suitable for rigid center, and the most approved arrangement of equalizing beams and springs. The truck wheels are of cast iron, 28 in. in diameter, ground flat on the treads. The truck axles are hammered iron with inside journals 5 × 9 in. The pilot is of wood, strongly braced and provided with a cast steel bullnose.

The connecting and parallel rods are forged steel of I-section bodies fitted with end straps, keys and bolts. Ajax metal is used for the bearings. The oil cups are large and are forged solid with the rods. The crank and crosshead pins are hollow, nickel-steel forgings. The crossheads are of cast steel with tinned bearings designed for four-bar guides, 4 in. wide. The guides are of Pennslyvania steel. The piston rods are of nickel steel and metallic packing is used on both pistons and valve rods. The pistons are cast steel with removable followers fitted with steam packing, while the steam chest valves are of the Allen-Richardson balanced type.

Fig. 3 shows in detail the arrangement of the cylinders and saddle casting when the engine is used as a compound locomotive. The cylinders are cast separate from the saddle, and are protected by magnesia sectional covering. As delivered the engine is arranged for simple working, and the cylinders on each side are 20 in. in diameter bushed to 16 in. One 30-in. cylinder is furnished for the left-hand side when the locomotive is used as a compound. It will be seen that it is possible to have a simple arrangement with either a 16-in. or 20-in. diameter cylinders; or a compound arrangement with either a 16-in. or 20-in. diameter cylinder on the right hand side, and a variable size cylinder on the left-hand side, by the use of bushings, ranging from a maximum of 30 in. in diameter to a minimum of 16 in. The stroke is 24 in. long.

When the engine is worked simple, the low-pressure cylinder, shown in Fig. 3, is detached from the saddle casting and frame, to which it is bolted, and replaced by a cylinder cast from the same pattern as the right-hand cylinder. The live steam from the boiler is led to openings *A* and *B* by means of steam pipes shown in Fig. 4. It will be noticed that the steam-pipe fastenings consist of four 1⅛-in. bolts. When used as a simple engine the openings *C* and *D* (Fig. 3) are covered and an exhaust nozzle is used, such as shown in Fig. 5, the cylinders exhausting through openings *E* and *F* (Fig. 3). As the engine is not equipped with air-brakes and air-pumps, the opening in the nozzle for the pump exhaust is covered.

When the engine is used as a compound, opening *B* is covered, while openings *C* and *D* are connected by the receiver pipe in the forward part of the smokebox. In this case the exhaust nozzle is of the form shown by *G* (Fig. 3), whereby the exhaust opening *E* is covered and the final exhaust is from opening *F*. The arrangement of the deflecting plate and netting in the smokebox is clearly shown in Fig. 6 and needs no explanation. The smokestack is of cast iron, 4 ft. high, and tapers from a diameter of 16⅞ in. at the top to a least diameter of 14 in.

The boiler is of the extended wagon-top type designed to carry a working steam pressure of 250 lbs. per square inch, and is shown in detail by Fig. 7. The material used in the boiler is Carnegie steel ⅝, ¾, 13/16 and ½-in. thick, and all plates are planed at the edges and calked. All horizontal seams are butt joints with inside and outside welt strips and are sextuple riveted; the circumferential seams are lap joints, double riveted. The dome is 30 in. inside diameter, and placed on the extension of the wagon top and secured to the boiler by means of a hydraulic pressed steel ring 1 in. thick; the dome cap also is of pressed steel ⅞ in. thick. A separate dome is provided for the safety valves. The outside diameter at the front end of the barrel is 52 in. The boiler is lagged with sectional magnesia covering, and jacketed with planished iron. The dome also is lagged with magnesia and covered with a sheet-iron casing. The boiler was tested by the maker under steam at 295 lbs. per square inch, and but little calking was found necessary to make the boiler perfectly tight under this pressure.

The firebox is between the frames and built of the best quality of carbon steel, being 72 1/16 in. long, 34¼ in wide and 79 in. deep at both the front and back. The crown sheet is 7/16 in. thick, the tube sheet 5/16 in., and the side and back sheets are ¾ in. thick. All sheets were annealed after flanging. The water space at the front is 4 in. wide, at the sides 3 in. to 3½ in., and from 3 to 4 in wide at the back. The mud rings are double riveted. The stay bolts are 1 in. in diameter and placed not over 4 in. from center to center, all short stay bolts having a 3/16-in. hole drilled 1¼ in. deep in the outside ends. The crownsheet is supported by radial stays, the three front rows being sling stays; the reminder are 1⅛-in. bolts screwed through the crown and outer sheet and riveted over, excepting the six central rows which have button heads under the crown sheet. The firebox has a brick arch supported on studs and ordinary cast-iron rocking grates are used. The tubes, 260 in number, are of No. 12 gage, charcoal iron, 2 in. in diameter and 11 ft. 6 in. long, set with copper ferrules at both ends.

The heating surface of the firebox is 126.46 sq. ft., that of the tubes 1,195.54 sq. ft., making a total heating surface of 1,322 sq. ft. The grate area is 17.74 sq. ft.

The cab is of wood with drop windows, and has a ventilator in the roof. The throttle lever adjustment is made by means of a large hand screw and smooth sector.

The following special equipment is used on the engine: C. C. Jerome, metallic packing for valve and piston rods and McIntosh blow-off cock; Ashton Valve Mfg. Co., two 2½-in. safety valves and steam gage; Detroit Lubricator Co., cylinder lubricator with improved Tippet attachment; Wm. Sellers & Co., boiler checks and two class N injectors, Nos. 6½ and 8½; Keasbey & Mattison Co., magnesia sectional covering for boiler, cylinders and steam dome; Star Brass Co., water gages; Midvale Steel Co., driving-wheel tires; New York Car Wheel Co., engine truck wheels.

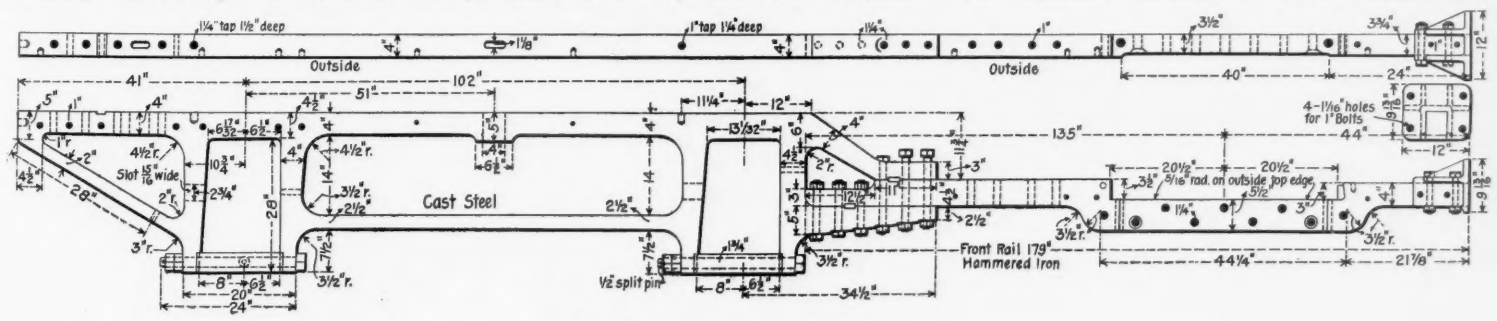


Fig. 2.—Frame Details—"Schenectady No. 2."

The American Steel Casting Co. furnished the following parts for which cast steel is used: Main engine frame, driving-wheel centers, crossheads, pistons, rock shafts, driving-box saddles, bumper knees, pilot bullnose and firedoor hinge.

The Bethlehem Iron Co. furnished the crank and crosshead pins, the piston rods and driving axles. These forgings are all made of fluid-compressed, acid open-hearth nickel steel annealed, and all except the piston rods are hollow and oil tempered. Test bars from these forgings show the following results, the test specimens used being ¼ in. in diameter and 2 in. long between measuring points: Ultimate tensile strength, 91,000 lbs,

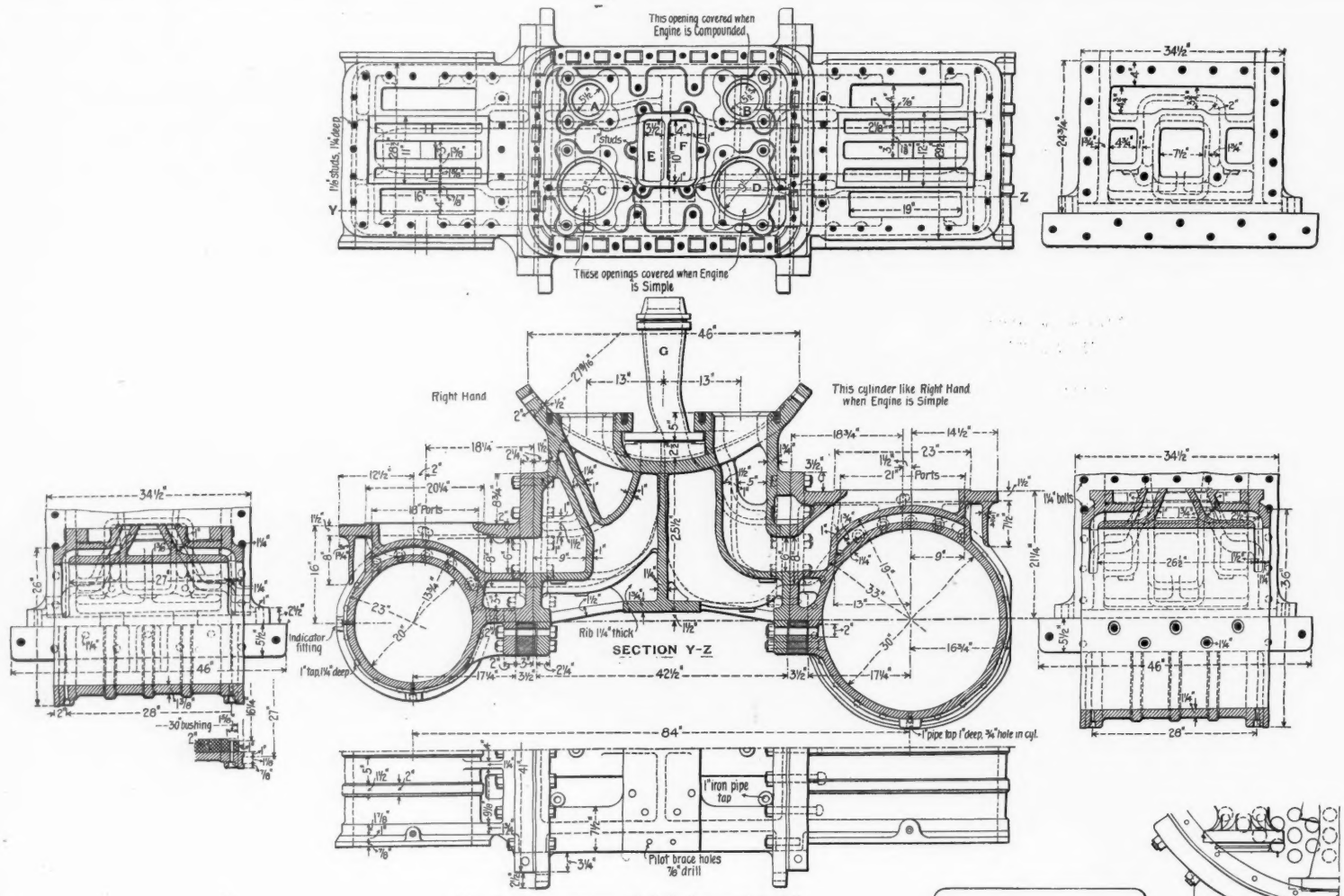

This opening covered when Engine is Compounded
These openings covered when Engine is Simple
Right Hand
This cylinder like Right Hand when Engine is Simple
SECTION Y-Z
Indicator fitting
Rib 1¼" thick
1" pipe tap 1" deep, ¾" hole in cyl.
1" iron pipe tap
Pilot brace holes 7/8" drill
1¼" bolts
Ports

Fig. 3.—Arrangement of Cylinders and Saddle.

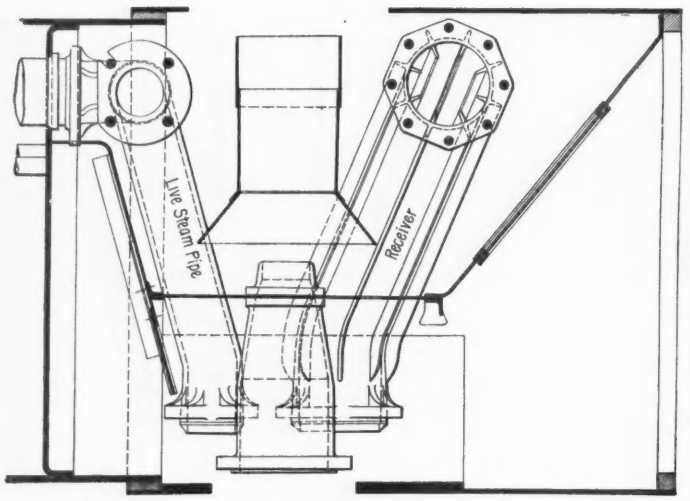
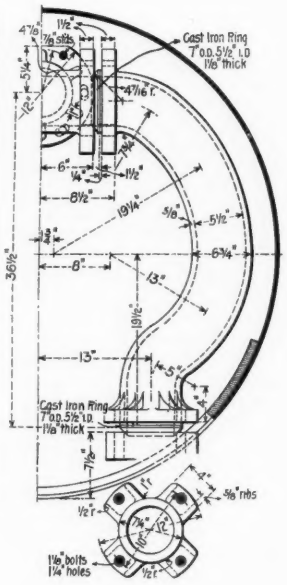


Fig 4 —Arrangement of Smokebox.



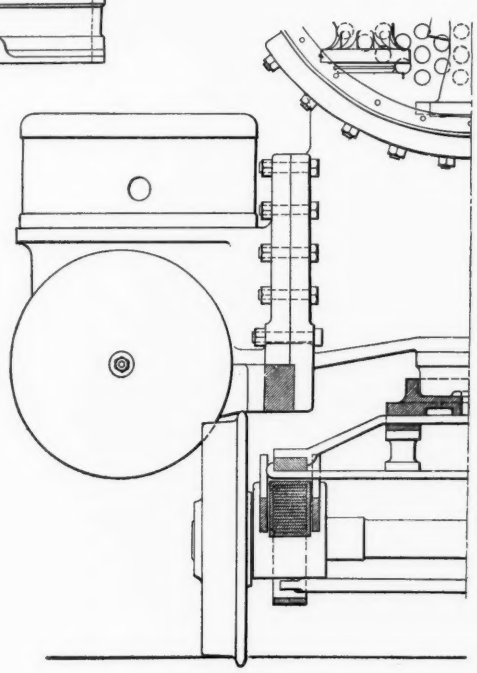


Fig. 3-A.

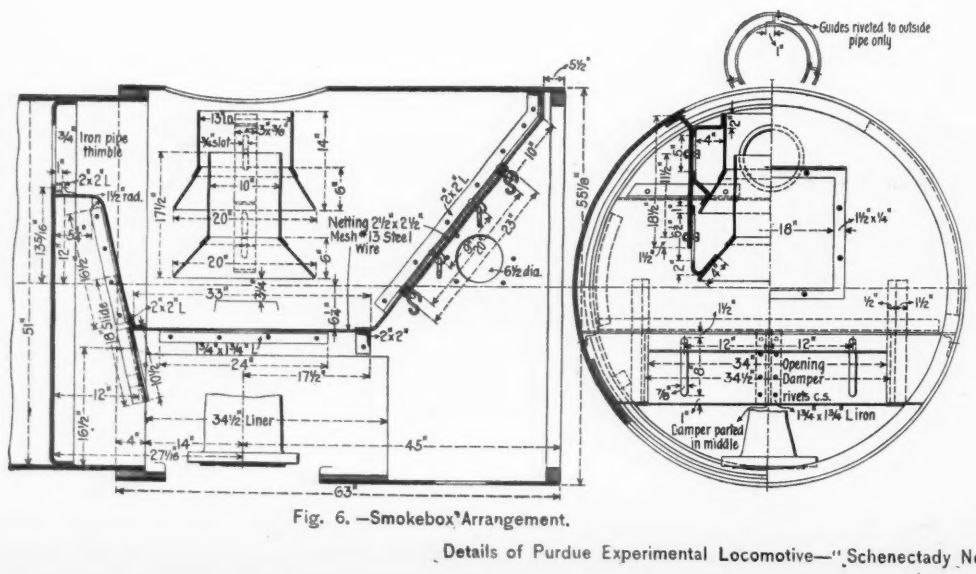


Fig. 6. —Smokebox Arrangement.

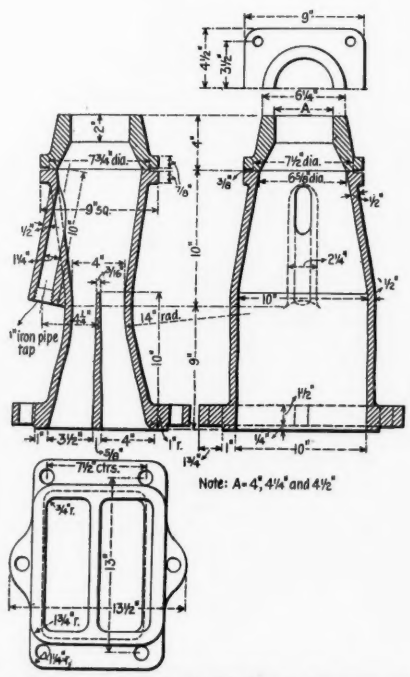


Fig. 5.—Exhaust Nozzle Used with Simple Arrangement.

Details of Purdue Experimental Locomotive—"Schenectady No. 2."

per square inch; elastic limit, 57,000 lbs. per square inch; elongation, 25.05 per cent.; contraction, 56.45 per cent.

The hydraulic flanged steel work of the Schenectady Locomotive Works has been extensively used in the construction of this engine. The boiler has hydraulic flanged steel back head, throat sheet, front tube sheet, flange connecting dome to shell, dome ring and dome cap. Other parts of pressed steel are the cylinder head casings, the top casings for the steam chest and the dome casing.

It is stated by Professor Goss, to whom we are indebted for early information regarding the engine, that, in receiving the new locomotive, the Purdue authorities are reminded anew of the interest often expressed and of the substantial assistance rendered by their many friends; that the Schenectady Locomotive Works has shown its interest by liberal concessions which were made at the time the contract for the engine was placed with them, and by the untiring devotion in the working out of all minor details in order that the engine might lack nothing which would increase its value in the laboratory; that, beside the manufacturers already named, mention should be made of the courtesies extended by the officers of the New York Central & Hudson River, the Lake Shore & Michigan Southern and the Lake Erie & Western Railroads with reference to the transportation of the engine from Schenectady to La Fayette.

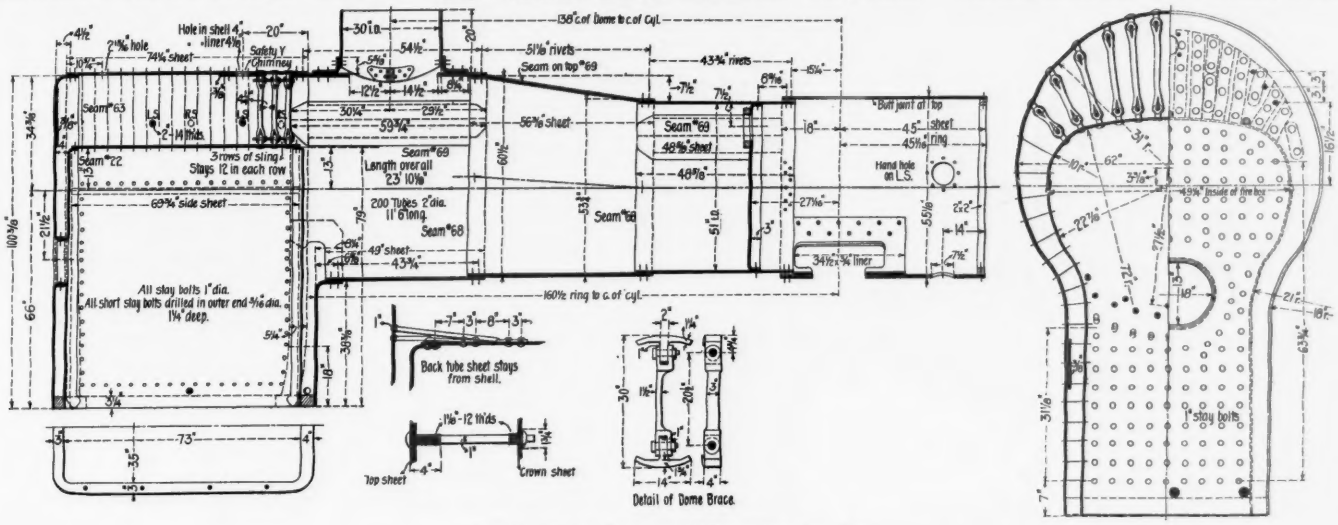


Fig. 7.—Boiler Details—"Schenectady No. 2."

English Railroad Practice.

Mr. Geo. B. Leighton, President of the Los Angeles Terminal Railway, at the November meeting of the St. Louis Railroad Club, presented a paper describing some peculiarities of English railroad practice as observed during a recent visit to England. Some extracts follow.

The conditions affecting the traffic working of English railroads are materially different from those in the United States. Although the mileage in the United Kingdom is about one-tenth that in the United States, the number of tons handled per annum is nearly one-half of those handled here. The carload business in England, as we understand it in this country, does not exist. Again, English rates are based on the ton as a unit, where ours are based on the carload. The average carload in England is not over three tons, but trains are moved with great promptness. Some freight trains are scheduled at 50 miles an hour. Again, in passenger traffic, with us it is exceptional that a full train can be expected from one terminal to another without intermediate stops. Most of our trains are obliged to do somewhat of a local business. In England the numerous cities, comparatively but a few miles apart, furnish a traffic like that between New York, Philadelphia and Washington.

The topography of England is rolling in character—in places almost mountainous. The early railroad builders so firmly believed that an engine and a car could not operate successfully on short curves or on heavy grades that the early lines were constructed on long planes and with curves of large radius, adapted to the rolling stock, all of which had had rigid wheel base. This involved crossing wide valleys by high bridges and the construction of tunnels. Hence the (capital) cost was necessarily great. Unfortunately, the clearance allowed by the early works was small in width and height. These are general characteristics of the English trunk lines. There are some heavy grades and sharp curves in England, and especially in Scotland and Ireland.

A prominent characteristic of the English railroads is that they have been built to endure. The substructure of English lines is solid. The cuttings are well sloped and well drained. Where possible, masonry viaducts are used. The bridges have enormous weight and strength. Single-track construction has been carried out on this same general scale. Important stations are of brick or stone, well lit by glass roofs. We have not adopted glass roofs as we should have done. Glass roofs can be made tight and they make a station cheerful and attractive, which would otherwise be very dark and dingy.

From the early location of many of these lines, it is easy to infer that the engineers were more or less limited in their choice of location; that is, but little lateral variation in the right of way was permissible. At that time the owners of estates and boroughs did not want the unsightly locomotives to cross them. The consequence of these conditions was that enormous prices were paid for rights of way and leases. To this day the North Eastern Railway is paying nearly a quarter of a million dollars annually for leases of rights of way; they would like to change their line and acquire the ownership, saving this great expense. However, the English landlord, at first desiring to be compensated for the injury to his property by the trespass of the locomotive, is now unwilling to lose this source of revenue, having decided that the locomotive is not so bad after all. A bill to enable this company to so change its right of way has been defeated by the landed interests at several sessions of Parliament.

Average English rails appear to be better rails than the average American. Here is a subject that the Committee on Subjects should give to somebody. It is certainly worthy of consideration "The Present American Rail." The joints are loose, often low, the click being very noticeable, and are not as good as on most trunk lines in America. The joints are necessarily suspended and have the common fish-plate. The London & North Western is using in the main line 60-ft. rail, but it is alone in this practice.

The English rolling stock is tending toward standard types, especially in engines. While the single driver engine is in use on the Great Northern, with apparent satisfaction, the standard English passenger engine of to-day is one 18 × 24 in., inside connected, having four coupled drivers, and a bogie or common truck leading, and a deep copper firebox. On the North Western, and following it in many respects the Lancashire & Yorkshire, a truck with a radial axle box is substituted for the common four-wheeled bogie truck. The weight of the average English express engine alone is about 45 tons, of which 30 tons are on the drivers. This gives an approximate weight on each driver of about 7½ tons, which is not so much less than on many of our passenger engines. Recently they have built some consolidation engines in England on the Great Western whose weight is very much more than that. Freight engines are six-coupled without trucks, their weight being often upward of 50 tons. There is a type of engine in use in England designed for short runs under 50 miles having side tanks. This engine runs equally well in either direction. Boilers are straight.

On some English lines the Ramsbottom track tank is in use. The advantage of this in passenger service is already appreciated by American lines, but the point seems to escape notice that in handling freight on a busy line there is much to be gained by this device. Freight trains run from Crewe to London, a distance of upward of 150 miles, without stopping for water. The use of the track tank allows the use of smaller and lighter tenders. The standard tender of the London & North-Western goods engine is only 1,800 gals., but on this point, again, English practice is not uniform. The Great Northern, being part of the East Coast line to Scotland (one of the lines making the fast runs), does not use the track tank, and is thereby forced to carry a tender of large proportions and great weight. That is a point, it seems to me, that the American trunk lines do not appreciate; even some eastern lines that have track tanks in service for passenger work have not adopted them for freight. Why not use the track tanks in freight service as well as passenger, and thus avoid carrying this immense extra dead weight?

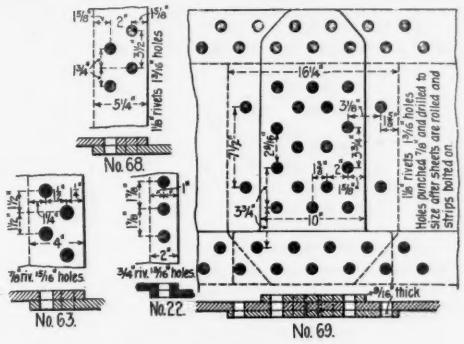

No. 68.
No. 63.
No. 22.
No. 69.
16 rivets 1⅛ holes
Holes punched ⅛ and drilled to size after sheets are rolled and strips bolted on
⅞" thick

Fig. 7-A.

In station service the English practice is different from American, and more efficient for English usage. It is questionable if, in some respects, it would not be preferable with us. At passenger stations platforms are on a level with car sill, which, with the side door, enables one to step quickly and safely from the car to the platform. It is noticeable that in two instances where we have in this country the densest traffic, elevated platforms have been resorted to—on the New York and the Chicago elevated lines, and in the Illinois Central suburban service. It is a mistake to imagine that trains cannot be unloaded quickly from side doors.

In freight station service there is a conspicuous difference between American and English practice. Generally, English local rates are based on the idea of store-door receipt and delivery, in which case the company conveys the goods to the station by its wagon, and delivers them by wagon to the consignee. This enables the company to have full control of the wagons at the station yard, and to allow a wagon to remain loaded for some hours, the horses being detached and used on another. From this practice has grown that of collecting the goods during the day, and not attempting to load the cars or trucks until afternoon; then the loading is done with great rapidity, the wagons being backed up against the platform, and trains are dispatched promptly and frequently. After midnight, incoming trains arrive in the same station, goods are loaded into the wagons, now empty, which brought in the goods in the early evening, and at daylight horses are brought into requisition and the goods promptly delivered. Several London freight stations have two stories, the underground part being devoted to the loading of cars, and the other to the marshaling of trains, a hydraulic car elevator being used.

In passing it is well to note a word in regard to English signal practice, which, it is the general belief of Americans who visited that country this summer, is not as efficient as the best practice here. The absolute block system prevails, the blocks being manually controlled. No electric locking is in use, except on certain lines south of London, where the Sykes system is somewhat used. Electric track circuits seemed unknown. Generally there is no check to a man giving a clear signal when the train is in block, excepting his feeling that he must not. Single lines are worked wholly by the staff or tablet; a runner being obliged to have this staff before he may proceed over a section, but these are often delivered and received at considerable speed.

The New Haven road in this country is working with success switches 1,500 ft. from the cabin by the manual system, and signals 2,000 feet, while the practice in England is never to locate a signal more than 1,000 ft. away. The ordinary form of semaphore is in use, but it is pleasing to note that the white light for night signals has been abandoned. Red indicates "stop," green "safety," and no caution signals are in use. If they are not needed with the dense traffic in England, it would seem as if we should be able to avoid their use in this country.

A few words only are necessary about organization. The Board of Directors is large, but it is an active board, both as a whole and through the sub-committees, which are frequently in session with the General Manager, the General Manager himself carrying out the policy as outlined by the various committees. Inspector is a term frequently met with. It refers to a class of officers constantly on the line investigating the working of all departments and reporting the condition direct to the General Manager. In other words, they enable the General Manager's eye to be in many places at once. It would seem as if on our large systems they would be of great assistance and relieve the manager of much detail work now often neglected.

I may here mention two institutions which have an important bearing on the English practice. The English Railway Clearing House handles all the traffic relations between the railways, but does not deal with the public. It was established by act of Parliament in 1842, being given powers by which it could sue under the name of its secretary. Each railroad and steamboat company in the United Kingdom has one representative on the General Committee. No company is forced to assent to any regulations that it does not desire to. The facility by which the auditing of this great traffic of upward of a thousand million passengers and four hundred thousand million tons of freight annually is handled is interesting. The Clearing House has an executive board, which is in constant session at its headquarters in London, the secretary being the active officer. Accounts are kept of upward of two thousand pairs of stations, and the clerical force in the office and inspectors at junctions number upward of two thousand. Demurrage and lost baggage are departments of the Clearing House, but especially its function is the interchange of traffic, passenger and freight. While the Railway Clearing House has no dealings with the public, the Board of Trade, by its regulations and special committees established in 1840, covers the relation.

Some Practical Applications of the Mass Curve in Earthwork Computations.*

BY WALTER L. WEBB.†

When analyzing the cost of earthwork, the most variable item of cost is that depending on the distance haul, and . . . it becomes necessary to devise a means which will give at least an equivalent of the haulage of all the earth moved. Evidently the *average* haul for any mass of earth moved is equal to the distance from the center of gravity of the excavation to the center of gravity of the embankment formed by the excavated material.

Fig. 1 shows a simple typical case in which the cut on the left will be used up in forming the embankment on the right up to the point *c*. *a* is the position of the center of gravity of the cut and *b* that of the fill, and the

*Paper read Nov. 20, 1897, before the Engineers' Club of Philadelphia, and reprinted, by permission, from the proceedings of the Club. See also an article by Prof. C. Frank Allen, Mass. Inst. of Technology, in the *Railroad Gazette*, May 24, 1895, page 325 – EDITOR RAILROAD GAZETTE.

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horizontal distance between a and b represents th *average haul*. As a rough approximation, the center of gravity of a cut (or fill) may sometimes be considered to coincide with the center of gravity of that part of the profile representing it, but the error is frequently very large. The center of gravity may be determined by various methods, but the method of the "mass curve" accomplishes the same ultimate purpose (the determination of the haul) with all sufficient accuracy, and also furnishes other valuable information.

In Fig. 2, let A' B' . . . . G' represent a profile and grade line drawn to the usual scales. Assume A' to be a point past which no earthwork will be hauled. Above every station point in the profile draw an ordinate which will represent to some scale the algebraic sum of the cubic yards of the cut and fill (calling cut + and

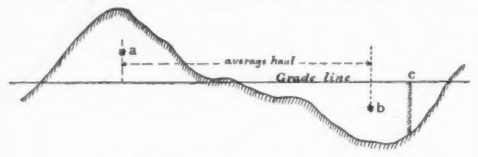


Fig. 1.—Simple Typical Case—Illustrating Average Haul.

fill —) from the point A' to the point considered. In doing this, shrinkage must be allowed for by considering how much embankment would actually be made by so many cubic yards of excavation of such material. For example it will be found that 1,000 cubic yards of sand or gravel, measured in place, will make about 900 cubic yards of embankment; therefore all cuttings in sand or gravel should be discounted in about this proportion. Excavations in rock should be increased in the proper ratio. In short, all excavations should be valued according to the amount of *settled* embankment that could be made from them.

The computations may be made systematically in tabular form. Place in the first column a list of the stations; in the second column the number of cubic yards of cut or fill between each station, and the preceding station; in the third and fourth columns the kind of material and the proper shrinkage factor; in the fifth column a repetition of the quantities in cubic yards, except that the excavations are diminished (or increased, in the case of rock) to the number of cubic yards of settled embankment, which may be made from them. In the sixth column, place the *algebraic sum* of the quantities in the fifth column (calling cuts + and fills —) from the starting point to the station considered. These algebraic sums at each station will be the ordinates, drawn to some scale, of the mass curve. (See Fig. 2.)

The scale to be used will depend somewhat on whether the work is heavy or light, but for ordinary cases a scale of 2,000 to 5,000 cubic yards per inch may be used. Drawing these ordinates to scale, a curve A, B . . . G, may be obtained by joining the extremities of the ordinates.

Properties of the Curve.

(1) The curve will be rising while over cuts, and falling while over fills.

(2) A tangent to the curve will be horizontal (as at B,

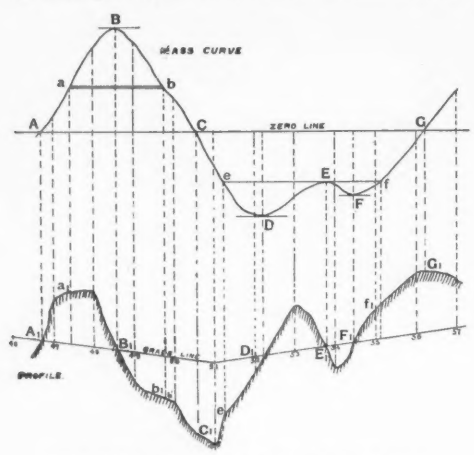


Fig. 2.—Mass Curve and Profile—Typical Case.

D, E and F), when passing from cut to fill, or from fill to cut.

(3) When the curve is *below* the "zero line," it shows that material must be drawn *backward* (to the left); and *vice versa*, when the curse is *above* the zero line, it shows that material must be drawn *forward* (to the right).

(4) When the curve crosses the zero line (as at A and C), it shows (in this instance) that the cut between A' and B' will just provide the material required for the fill between B' and C', and that no material should be hauled past C', or, in general, past any intersection of the mass curve and the zero line.

(5) If any horizontal line be drawn (as a b), it indicates that the cut and fill between a' and b' will just balance.

(6) When the center of gravity of a given volume of material is to be moved a given distance, it makes no difference (at least theoretically) how far each individual load may be hauled, or how any individual load may be disposed of. The summation of the products of each load times the distance hauled will be a constant, whatever the method, and will equal the total volume times the movement of the center of gravity. The *average haul*, which is the movement of the center of gravity, will, therefore, equal the summation of these products divided by the total volume. If we draw two horizontal parallel lines at an infinitesimal distance, $d\,x$, apart, as at a b, the small increment of cut $d\,x$ at a', will fill the corresponding increment of fill at b', and this material must be hauled the distance, a b. Therefore, the product of $a\,b$ and $d\,x$, which is the product of distance times volume, is represented by the area of the infinitesimal rectangle at a b, and the total area, A, B, C, represents the summation of volume times distance for all the earth movement between A' and C'. This summation of products divided by the total volume gives the average haul.

(7) The horizontal line (see Fig. 3), tangent at E, and cutting the curve at e, f and g, shows that the cut and fill between e' and E' will just balance and that a *possible* method of hauling (whether desirable or not) would be to "borrow" earth for the fill between C' and e', use the material between D' and E' for the fill between e' and D, and similarly balance cut and fill between E' and f' and also between f' and g'.

(8) Similarly the horizontal line h k l m may be drawn cutting the curve, which will show another *possible* method of hauling. According to this plan, the fill between C' and h' would be made by borrowing; the cut and fill between h' and k' would balance; also that between k' and l' and between l' and m'. Since the area e h D k E represents the measure of haul for the earth between e' and E', and the other areas measure the corresponding hauls similarly, it is evident that the sum of the areas e h D k E and E l F m f, which is the measure of haul of all the material between e' and f', is largely in excess of the sum of the areas h D k, k E l and l F m, plus the somewhat uncertain measures of haul due to borrowing material for e' h' and wasting the material between m' and f'. Therefore, to make the measure of haul a minimum, a line should be drawn which will make the sum of the areas between it and the mass curve a minimum. Of course, this is not necessarily the cheapest plan, as it implies more or less borrowing and wasting of material which *may* cost more than the amount saved in haul. The comparison of the two methods is quite simple, however. Since the amount of the fill between e' and h' is represented by the *difference* of the ordinates at e and h, and similarly for m' and f', it follows that the amount to be borrowed between e' and h' will exactly equal the amount wasted between m' and f'. By the first of the above methods the haul is excessive, but is definitely known from the mass diagram and all of the material is utilized; by the second method the haul is reduced to about one-half, but there is a known quantity in cubic yards wasted at one place and the same quantity borrowed at another. . . .

(9) Suppose that it were deemed best, after drawing the mass curve, to introduce a trestle between s' and v', thus saving an amount in fill equal to t v. If such had been the original design, the mass curve would have been a straight horizontal line between s and t, and would continue as a curve which would be at all points a distance t v above the curve v F z m f G g. If the line E f is to be used as a zero line, its intersection with the new curve at x will show that the material between E' and z' will just balance if the trestle is used, and that the amount of haul will be measured by the area between the line E x and the broken line E s t x. The same computed result may be obtained without drawing the auxiliary curve t x n . . . . by drawing the horizontal line z y at a distance x z ($= t$ v) below E x. The amount of the haul can then be obtained by adding the area between E s and the horizontal line E x, the rectangle between s t and E x and the irregular area between v F z and y . . . . z (which last is evidently equal to the area between t x and E . . x). The disposal of the material at the right of z' would then be governed by the indications of the profile and mass curve which would be found at the right of g'. In fact, it is difficult to decide with the best of judgment as to the proper disposal of material without having a mass curve extending to a considerable distance each side of that part of the road under immediate consideration.

Area of the Mass Curve.

The area may be computed most readily by means of a planimeter, which is capable with reasonable care of measuring such areas with as great accuracy as is necessary for this work. If no such instrument is obtainable the area may be obtained by an application of "Simpson's rule." The ordinates will usually be spaced 100 ft. apart. Select an *even* number of such spaces, leaving, if necessary, one or more triangles or trapezoids at the ends for separate and independent computation. Let y_0 . . . y_n be the ordinates, *i. e.*, the number of cubic yards at each full station of the mass curve, the figures in column six of the above tabular form. Let the uniform distance between ordinates (= 100 ft.) be called 1, *i. e.* one *station*. Then the units of the resulting area will be cubic yards hauled one station. Then the area $= \frac{1}{3}\,[y_0 + 4\,(y_1 + y_3 + \ldots y_{(n-1)}) + 2\,(y_2 + y_4 + \ldots y_{(n-2)}) + y_n]$.

When an ordinate occurs at a substation, the best plan is to ignore it at first and calculate the area as above. Then if the difference involved is too great to be neglected, calculate the area of the triangle having the extremity of the ordinate at the substation as an apex and the extremities of the ordinates at the adjacent stations as the ends of the base. This may be done by finding the ordinate at the substation that would be a proportional between the ordinates at the adjacent full stations. Subtract this from the real ordinate (or *vice versa*) and multiply the difference by $\frac{1}{8} \times 1$. An inspection will often show that the correction thus obtained would be too small to be worthy of consideration. If there is more than one substation between two full stations the corrected area will consist of two triangles and one or more trapezoids which may be similarly computed—if necessary.

When the zero line (Fig. 3) is shifted to a E, the drop from C n to E is known in the same units, cubic yards. This constant may be subtracted from the numbers (column six in the tabular form) representing the ordinates and will thus give, without any scaling from the diagram, the exact value of the modified ordinates.

Limit of "Free Haul."

It is sometimes specified in contracts for earthwork that *all* material shall be entitled to free haul up to

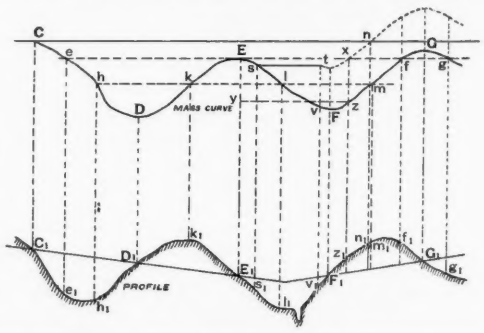


Fig 3.—Mass Curve and Profile—Showing Special Features

some specified limit (say 500 or 1,000 ft.) and that all material drawn farther than that shall be entitled to an allowance on the *excess* of distance. It is manifestly impracticable to measure the excess for each load, as much so as to measure the actual haul of each load. The mass curve also solves this problem very readily. Let Fig. 4 represent a profile and mass curve for about 2,000 ft. of road and suppose that 800 ft. is taken as the limit of free haul. Find two points, a and b, in the mass curve *which are on the same horizontal line* and which are 800 ft. apart. Project these points down to a' and b' Then the cut and fill between a' and b' will just balance and the cut between A' and a' will be needed for the fill between b' and C'. In the mass curve, the area between the horizontal line a b and the curve a B b represents the haulage of the material between a' and b' which is all free. The rectangle a b m n represents the haulage of the material in the cut A' a' across the 800 ft. from a' to b'. This is also free. The sum of the two areas A a m and b n C represents the haulage entitled to an allowance, since it is the summation of the products of cubic yards times the *excess* of distance hauled.

If the amount of cut and fill was symmetrical about the point B', the mass curve would be a symmetrical curve about the vertical line through B, and the two limiting lines of free haul would be placed symmetrically about B and B'. In general there is no such symmetry, and frequently the difference is considerable. The area a B b n m will be materially changed according as the two vertical lines a m and b n, always 800 ft. apart, are shifted to the right or left. It is easy to show that the area a B b n m is a *maximum* when a b is horizontal. The minimum value would be obtained either when m reached A, or n reached C, depending on the exact form of the curve. Since the position for the minimum value is manifestly unfair, the best definite value obtainable is the maximum which must be ob-

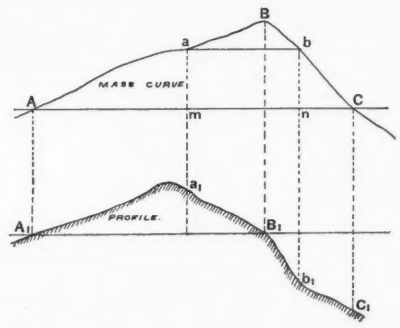


Fig. 4.—Mass Curve and Profile—Illustrating Limit of Free Haul.

tained as above described. Since a B b n m is made maximum, the remainder of the area, which is the allowance for overhaul, becomes a minimum. The areas A a m and b C n may be obtained with a planimeter or by the application of Simpson's rule. If the whole area A a B b C A has been previously computed, it may be more convenient to compute the area a B b n m and subtract it from the total area.

Since the intersections of the mass curve and the "zero line" mark limits past which no material is drawn, it follows that there will be no allowance for overhaul except where the distance between consecutive intersections of the zero line and mass curve exceeds the limits of free-haul. . . .

Value of the Mass Curve.—The great value of the mas

curve lies in the readiness with which different plans for the disposal of material may be examined and compared. When the mass curve is once drawn, it will generally require only a shifting of the horizontal line to show the disposal of the material by any proposed method. The mass curve also shows the extreme length of haul that will be required by any proposed method of disposal of material. This brings into consideration the "limit of profitable haul." With each method of carrying material there is some limit beyond which the expense of hauling will exceed the loss resulting from borrowing and wasting. With wheelbarrows and scrapers the limit of profitable haul is comparatively short, with carts and tramcars it is much longer, while with locomotives and cars it may be several miles. If, in Fig. 3, *e E* or *E f* exceeds the limit of profitable haul, it shows at once that some such line as *h k l m* should be drawn and the material disposed of accordingly.

In conclusion I wish to especially emphasize the point in regard to the reduction of the bid for earthwork rendered possible by this method. You know that the average railroad contractor is a man who is very apt to make his estimate according to "judgment." He will look at the profile and from a mere inspection of it will make his estimate, and, of course, his experience will often enable him to make a close estimate as to what he could do in disposing of that material. When a graphical method, based upon mathematical principles, is employed, the guesswork is reduced, assuming, of course, that judgment is used in allowing properly for shrinkage, etc. It is possible to so diminish the uncertainty of it that a railroad may specify a disposal of material and thereby reduce the necessary expenses and bring the cost of the earthwork to a minimum. Then the specifications can be submitted to the contractors and they can at once see that the work will cost them a certain sum. By reducing the uncertainty of the work the bid can safely be reduced and probably will be.

Interlocking Plant at Hammond, Ind.

WITH AN INSET.

The National Switch & Signal Company, of Easton, Pa., has just completed, at Hammond, Ind., one of the largest interlocking plants in the United States. It was installed by the Chicago, Hammond & Western under the direction of the Signal Engineer, Mr. J. B. Cox, and is one of the most complicated interlockings thus far built. The general diagram, Fig. 1, shows the location of the tracks, switches and signals. These tracks are owned by the Chicago & Western Indiana; Chicago, Hammond & Western; Chicago & Calumet Terminal; Chicago & Erie; Chicago, Indianapolis & Louisville; Michigan Central; New York, Chicago & St. Louis; Pittsburgh, Ft. Wayne & Chicago (State Line & I. C.), and the Wabash roads. These with their tenant companies, the Chicago, Lake Shore & Eastern, and the Elgin, Joliet & Eastern, made a considerable variety of interests to be accommodated and satisfied in the design of the plant.

When the plan was first submitted to the signal company it was contemplated to put in only a portion of it at the present time; a full plan, however, was offered by the National Company, and it was expected that the installation would be carried out in such a manner as to make it possible to put in the additional work contemplated without much change in the arrangement of the connections. A complete plan was made by the signal company showing the location of every connection, crank and leadout, before any work was commenced on the ground, and this plan is partially illustrated by Fig. 2. But before the work was fairly under way several of the railroads found that their business required the introduction of some additional switches and so the plant was changed from time to time, complicating the work of the signal company and introducing elements which would tend to lead to errors in the locking unless every step was carefully scrutinized.

The machine was built at Easton on a foundation made of two channel beams, surfaced so as to present an accurate plane, and the locking was equally distributed on the front and the back of the machine. The machine is made to accommodate 224 levers, the total number now in service being 136, there being 20 levers in the machine not now in use.

In spite of all the various changes and the complex nature of the work, the machine was tested after the locking was in place and no errors were developed. This machine was exhibited to the members of the Railway Signal Club when they had their annual meeting in New York in September, at which time the members visited the works The economy of space possible with vertical locking is forcibly illustrated in this machine. It requires no more width of cabin than if it had but one lever.

The signal cabin is substantially and elegantly finished. The foundation is of concrete, the walls are pressed brick and the roof of slate, the entire structure being fireproof. The machine is supported by a steel plate girder. In order to give stability to the cabin and to support the floor, the floor joists have been run through the machine at intervals of 12 ft. This arrangement leaves spaces in the machine, as indicated in the photograph, Fig. 3, so that the signalman can walk through the machine at convenient points instead of having to go around the ends when he may wish to go to the front of the cabin. The dimensions of the cabin are 16 ft. × 100 ft. 8 in.

In designing a machine for a plant of this magnitude it is important to consider what train movements have to be made most frequently, so as to save steps for the signalmen. In this case, instead of following out the old practice of putting all the switch and locking levers in the center of the machine and the signal levers at the extreme ends, the machine has been divided into three parts and is practically three interlocking machines, with levers on a common center in one frame; and the practicability and economy of this plan has been clearly evidenced and illustrated since the opening of the plant, as it requires but two operators to manipulate the levers.

There are in the plant as now operated 62 signals, 68 switches, 70 facing point locks, one movable point frog and 39 crossing bars. The greatest distance at which a switch is operated is 1,242 ft.; the greatest distance at which a signal is operated is 2,492 ft. The levers have been in operation but a few days, but all of them move easily, the work having been put in carefully and double, anti-friction pipe carriers used. No selectors or switch-and-lock movements have been used in this plant.

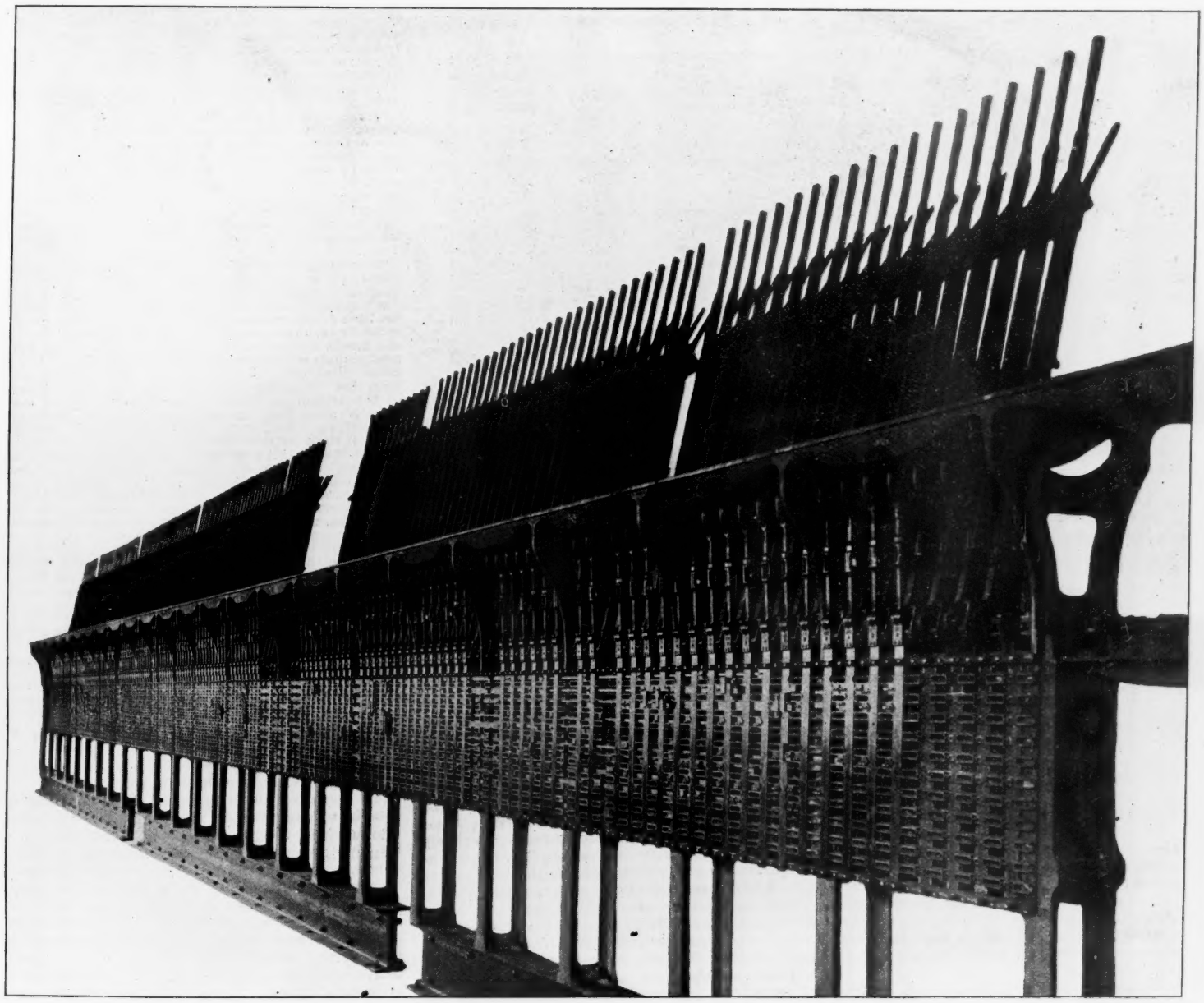


Fig. 3 — Interlocking Machine at State Line Crossing, Hammond, Ind.

Made by the NATIONAL SWITCH & SIGNAL CO., *Easton, Pa.*

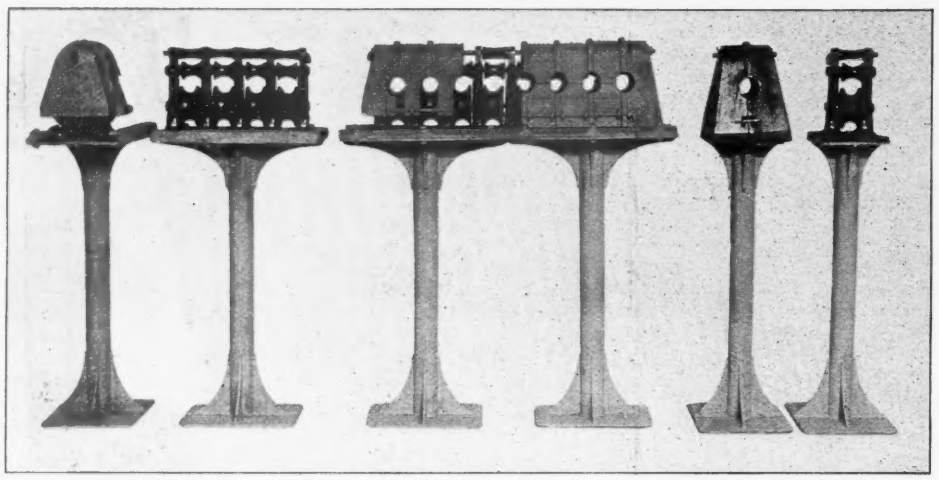
Hansel's Pipe-Carrier Foundation and Housing.

Mr. Charles Hansel, Vice-President of the National Switch & Signal Co., has lately designed and patented a malleable iron housing for the supports of rigid signal connections, and the National Company has put it on

the market. Examples of the housing and of castiron foundations for pipe carriers are shown in the accompanying engravings. Concerning the economy and utility of the housing Mr. Hansel says:

"The practice in the United States of housing the pipe lines, carriers, etc., in interlocking and signal work materially increases the cost for installation and maintenance, while the desirability of such housing is open to question. It certainly does not prolong the life of the pipe, for since the boxing is not weather-proof the pipe is kept damp and oxidization is promoted, and it is believed by many that it serves no more useful (?) purpose than to accommodate the pedestrians, who generally have no business on the railroad property and are invited there by the convenience of the thoroughfare provided by the boxing of these connections.

"The cost of painting and renewing boxing is a considerable item and seems to be unnecessary; why not apply this paint and labor directly to the pipe? Pipe lines should be open for inspection at all times in order that any defects may be noted. Breaks sometimes occur and if the pipe line is concealed by boxing they will not



Hansel's Pipe-Carrier Foundations and Housings.

be detected. Accidents have occurred by reason of the failure of the signal inspector to detect incipient failures, which if noted would have saved loss of life and property.

"But in order that pipe lines may be moved with the minimum friction the carriers should be protected from snow or dirt by housing, and for this purpose we offer this housing. It is made of malleable iron in separable pieces, so designed that for a one-way carrier two pieces only are required, and for each additional way one top piece and two side pieces are added. The housing is held in position by the bolt which passes through the top of the carriers, so no extra bolt is required. The separable side pieces are held in position by ordinary No. 9 telegraph wire passing through the lugs.

"This housing can be quickly placed and removed without disturbing the carriers or the pipes. Its design is such that it will protect the carriers from destruction by objects falling from a passing train and guard the carrier from the weather by keeping out snow, rain and dirt. It also minimizes the amount of lubricant necessary and reduces the cost of installing and maintaining an interlocking plant. It will be seen that these housings are practically everlasting and can be assembled and shifted about to suit the requirements of any changes or alteration in an interlocking plant, whereas wooden boxing, once installed, cannot be used again, and is short lived at best."

The iron foundation needs little description. It will be observed that foundations for large carriers are made up of units, so that they can be built for any number of ways without carrying more than one style of foundation in stock. No lag screws are used and carriers can be shifted easily on the foundation to a correct alignment, and they can be firmly clamped after they have been adjusted. It is believed that with this foundation the time saved in putting in a plant and making renewals would be considerable.

Commissioner Prouty on Pooling.

Interstate Commerce Commissioner Charles A. Prouty has written for the *Forum* (December) a 15-page article on "Pooling from the People's Point of View," being largely an answer to the pamphlet recently published by Mr. George R. Blanchard, Chairman of the Joint Traffic Association. Mr. Prouty starts out with the assertion that the purpose of a pooling law is to 'eliminate entirely the factor of competition." Between Chicago and Kansas City there are six lines "with no water connection to complicate the situation." If a pooling law were passed a pool would be made and rates would be raised. The reasoning leading to this conclusion is not very clear, for it is stated that the agreement to make an advance would be due to the discovery that one of the lines was not getting its share. Nevertheless, it is, in Mr. Prouty's opinion, incredible that these managers, if they had the unrestrained power, would not raise the rates.

Mr. Blanchard says that the railroads would make no advance in rates, except perhaps to restore unjustifiable rate war reductions. "But," says Mr. Prouty, "who is to say whether the reductions were justifiable or unjustifiable?" The railroads promise to use their power temperately; but "let it ever be remembered that the shearing of this lamb is for the wool, not for the comfort of the animal." Mr. Prouty calls attention to the fact that Mr. Cowen, of the Baltimore & Ohio, last summer practically admitted that the New York Central, the Pennsylvania and his own road were disobeying the law: and to the evidence given before the Commission at Chicago that one of the Eastbound lines out of that city had diverted freight to another line, "showing that the lines leading East from Chicago were maintaining a freight pool in open violation of the law." If these gentlemen justify themselves in defying the statute in the interest of their properties, would they not just as quickly advance a freight rate if they believed it too low?

Mr. Prouty denies that all rates are now low enough and that no advances are made. In 1894 the Chicago railroads added a $2 switching charge on livestock going to the Union Stock Yards; in 1890 the Florida roads raised the rate on oranges 10 cents a box, notwithstanding the existence of active water competition. It is not true that present rates are never complained of. Last April there were complaints concerning rates on vegetables from Florida to the North, on cotton from Texas to the seaboard and on corn from Kansas points to Galveston and New Orleans.

Mr. Prouty believes that pools would spring up everywhere, and that it is reasonably certain that lines leading from Kansas to Boston would join with those from Kansas to Galveston in a pool of export grain. The Foraker bill provides that pools disapproved by the Commission shall not go into effect, but this examination by the Commission amounts to nothing, because the rates are not to be filed with the pool. Every pooling act should specify the maximum rates and stipulate that no increase should be made during the term of the contract. The present power of the Interstate Commerce Commission to order rates changed is entirely worthless. If a complaint is made by a Board of Trade, no reparation can be ordered, because the complainant has suffered no damage. If a shipper complains, it is of no avail to order reparation to him, because he is generally nothing but a middle man. Neither the producer nor the consumer gets any benefit from moneys refunded to him. The only remedy is to make a rate for the future, and that the Commission cannot do.

If the railroads desire the same measure of regulation which England exercises, the people may well accede, for England has kept a firm hand upon the railroads. The Railway Commission can establish a through route and a through rate; the government fixes absolutely the maximum local rate, and the decision of the Railway Commission upon questions of fact is final.

In conclusion, Mr. Prouty says that he does not oppose the enactment of a pooling bill; the honest railroad manager is at a serious disadvantage and if he complies with the law does so at the expense of business which legitimately belongs to him; the fact that the relief asked for by the railroads may involve the creation of a "trust" is not conclusive against it; but "the public has vital interests which must be protected," and under the present law the Interstate Commerce Commission has no power to give this protection.

Attitude of the Railroads on the Proposed Pooling Law.

"One of the best informed of Eastern railroad presidents" is reported in the New York *Journal of Commerce* as follows: "At the present moment we do not know where we stand. Till the Supreme Court has decided the legal standing of the Joint Traffic Association it is impossible to say precisely what we want. We may have to ask for more legislation than seems at present necessary, or we may be able to get along with less. In any case, our immediate policy must be one of waiting. There is an additional reason why the railroads are not disposed to take the initiative in urging the passage of the pooling bill. The more it is made to appear that such a law is, primarily and solely, for our benefit, the more oppressive will be the conditions attached to it. The Interstate Commerce Commissioners are already declaring that there can be no legalized pooling unless they can have the rate-making power, which the courts have declared that the law did not confer.

"The pooling question is not one which solely, or even chiefly, concerns the railroads. Some of the interior boards of trade have been induced to take a back track in regard to the desirability of pooling; Kansas City, for example. You probably know enough about the influences that prevail in that quarter to have a suspicion that the large shippers with headquarters there may apprehend that a pooling law would interfere with the special terms they are now able to make for the transportation of their freight. The most powerful opposition to pooling comes largely from this very class, which you will find largely represented at every important shipping point from New York to San Francisco. They are, it is true, a small minority in point of numbers, and a minority even in point of interest, but they are working for a common end and they know what they want. The majority who are interested in the maintenance of uniform rates lack unity either of action or purpose, but sooner or later the time must come when they will have to bestir themselves or be wiped out. . . . Railroad men are tired of making their plea to Congress for simple justice. They are always supposed to have some sinister end in view. . . . There can be no permanent prosperity in this country while so much railroad property remains unproductive. That is a point which the people will have to recognize and act on before the politicians in Congress and State legislatures can be made to see it. . . .

"As to empowering the Commission to supervise rates on pooled freight, it is the direction of the step and not its length that is significant. I am willing to concede the right of the Commission to pass on the reasonableness of rates fixed for the freight coming under a pooling agreement, though its action in the Chicago & Cincinnati Freight Bureau case, which was reversed by the Supreme Court, does not give one great respect for the judgment of its members. But I am not willing to have this concession accepted or interpreted as conferring a right to prescribe not only the rates fixed under a pool, but throughout the whole range of railroad transportation.

"As a matter of actual practice this whole question of reasonable or unreasonable rates on trunk lines will always settle itself without any outside intervention. Do you suppose for a moment that any combination among the lines doing business between New York and Chicago could fix an unreasonable rate that would stand the test of a month's experience? Why, half a cent on the hundred pounds would turn the whole traffic affected in another direction. There is the Soo combination with the Canadian roads tributary to the seaports of the Dominion; there is the Illinois Central connection with New Orleans, one of the strongest competitors we have for ocean-bound freight. There is the constantly lengthening lake season of navigation, lasting this year up till the middle of December, and which but for the insurance companies might last up till the middle of January, with the steadily downward course of lake rates as the steamers grow larger and the channels deeper. There is the mixed rail and river transportation, by which the Southern seaboard ports are supported, and there are the railroad feeders of Philadelphia and Baltimore. Beyond and controlling them all is the sharp and fierce competition of the world, which fixes the rates of inland transportation as inevitably as it does those of ocean carriage. You cannot hamper the operation of the laws of commerce by any petty interference on the part of an Interstate Commerce Commission or any other body similarly constituted. The concession to the railroads of the greatest possible freedom to manage their own affairs must in the end work to the profit of the public, because the interests of trade and those of the railroads are substantially identical."

The Annual Inspection of the Boston & Albany Railroad.

BY MR. GEORGE W. BLODGETT.

In order suitably to recognize the ability and faithfulness and to stimulate the interest of those employees who maintain the permanent way, it has been for a long time the custom of the officials of the Boston & Albany to make in the autumn of each year a careful examination of the whole line of the road, in which special consideration is given to the physical condition and the appearance of the stations, grounds and fences, but a much more detailed and thorough inspection is made of the roadbed, track, ditches, culverts, frogs, switches, crossings, sidetracks, etc. This inspection requires several days, and is made with a special train, consisting of an observation car, dining and sleeping cars, and at the rear of the train Mr. P. H. Dudley's dynagraph car.

The observation car is fitted with seats facing the forward end, each row of which is on a platform raised above those in front so that from every part of the car a clear view of the track can be obtained, unobstructed by the people in other rows. The front of this car is almost entirely made of plate glass, and being placed at the front of the engine, each of the observers is in a favorable position to see everything ahead of the train. The train is run at a speed as uniform as possible, at a rate of about 20 miles an hour, stopping or slackening speed at the end of each section to record the notes taken and clearing the track for following trains whenever necessary.

The party usually consists of about 40 of the engineers, roadmasters, superintendents and other officials, and usually some definite part of the work is assigned to each, the observations of every man being recorded at the time, and a careful examination being made of each feature for every section of the entire line. From all these records a preliminary determination of the relative condition of the different sections is made, subject to correction or modification.

The dynagraph car, attached to the rear of the train, gives the most complete and reliable information to be obtained of the actual condition of the track, and from this evidence, taken in connection with the visual observations, a final award is made to the divisions and sections entitled under the rules to receive it.

Descriptions have before been given in the columns of

the *Railroad Gazette* of this car and its work, but as there have been in recent years some minor changes in the apparatus, a brief description of its principal features may be of interest.

This car, about the size of an ordinary passenger coach, is mounted on an ordinary four-wheeled truck at one end and a six-wheeled truck of peculiar construction at the other. The last-named truck has the middle pair of wheels secured to the others with a connection that admits of the greatest freedom of movement in a vertical plane of the axle on which they are mounted, and of each end independently, so that the smallest variation in the relative position of the middle wheels and those on either side may be taken account of. It was no easy task to so design and assemble all parts of this apparatus that each should perfectly fulfill its function, without interference with any other, and all be combined within the limits of the available space. Many complex mechanical problems had to be solved, and much experimental work done before the machinery took its final form, but of the perfection of the design and the astonishing accuracy of the results, Mr. Dudley, who invented and superintended the building of it, may well be proud.

The six-wheeled truck contains other novel features. On one of the axles is mounted a worm wheel, which by means of suitable gearing and other attachments transmits rotary motion to the car above. The wheels to which this worm is connected, are turned with great accuracy to the exact size required, and carefully chilled, in order that there may be no appreciable wear. From

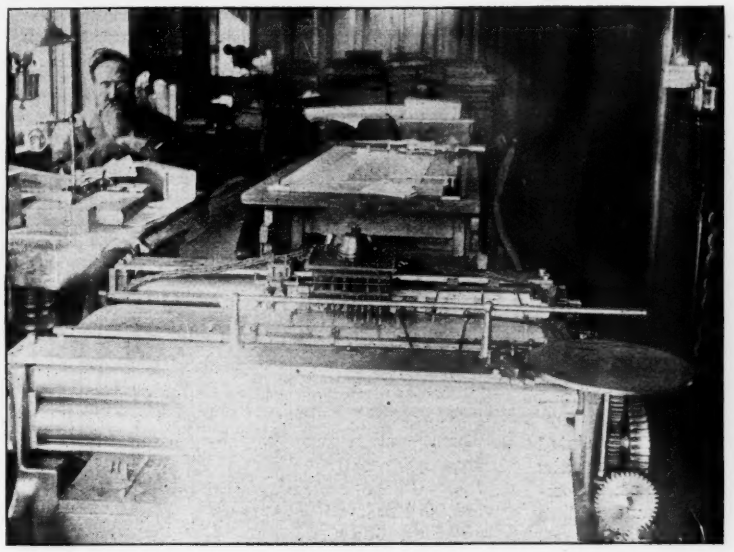


Fig 1.—Truck of Dudley's Dynagraph Car.

e axle, through the gearing connected therewith, motion is given to a roll of paper on a drum in the car above, which revolves at a rate proportional always to the speed of the train, with the uniform ratio of 50 ft. of track to one inch of paper. There is also a pair of flat disks running between the rails, which serve to detect the slighest variation in the gage. These may be clearly seen in the view of this truck, shown in Fig. 1.

About one-half of the car at one end is taken up by a suite of living rooms for Mr. Dudley and his wife, living in the car all the time, as well as journeying in it from place to place, and Mrs. Dudley, it may be mentioned, is the recorder of the observations from the diagrams during the inspections. The other part of the car, directly over the six-wheeled truck, contains a machine, also of Mr. Dudley's design, which records on the roll of paper before mentioned the actual condition of the track below as the car passes over it. As the whole apparatus in the car receives its motion from the single connection with the worm gear, there is the same relative speed whether the train be moving fast or slow, and there are never any corrections or allowances to be made for lost motion, or variations in speed, or for a lack of corelation between the parts.

The paper, slowly unrolling from the drum on which it is wound, passes over the smooth curved surface of a recording table of peculiar form, thence through guide rolls to a long table where the necessary data for each mile are taken off, and is then wound on another drum. (See Figs. 2 and 3.) Besides the lines and curves which give the information sought (and which are printed in red), there are groups of blue lines in series, about one-tenth of an inch apart, which are reference lines for the most important of the 14 red lines containing the records themselves (Fig. 4).

The simplest of these are the time and speed lines. A chronometer marks on the paper every second, and each tenth second is marked on another line. As the paper moves at a rate proportional to that of the train, the time register gives the means of determining the exact speed of the train at every instant of its journey.

Perhaps the next most interesting of the quantities recorded on the diagram is that showing the alignment of the track, and the elevation of the outer rail on curves, the true amount of which is given on the paper. Variations in the gage are shown in their respective places and amounts by means of the pair of disks running against the rails of which mention has already been made. They are pressed against the rail by stiff spiral springs on the axle, and show the smallest variation of the gage from the standard. When the car is not being used for inspection purposes, these disks with the axle that carries them can be raised out of the way

The most important and serviceable, however, of the quantities registered by the car for the purposes of this inspection are those which show the depressions and irregularities of the surface of each rail as they actualiy exist, and require no correction for exaggeration or diminution of the scale. The horizontal scale of the diagrams is 50 ft. to the inch, while the vertical scale is full size hence each depression of either rail is shown without distortion. Other ingenious apparatus sums up for each mile all the depressions, however slight, and records the total separately for each rail. Nor is this all; supported by the truck near the middle pair of wheels, on each side, a small pneumatic force-pump is attached, connected to a tank or reservoir in the car above; also with the air pressure by a branch from the brake pipe. The valve of this pump is adjustable, and so arranged that it will be opened by the depression of the middle pair of wheels beyond a certain predetermined amount, for which the apparatus is set before the beginning of the run. For the Boston & Albany the distance has varied in recent years from $\frac{3}{32}$ to $\frac{1}{8}$ of an inch, and represents the smallest variation in the height of the middle wheels compared with the outside ones, of sufficient magnitude to be registered; none go uncounted, and the sum total is recorded for each rail separately for every mile.

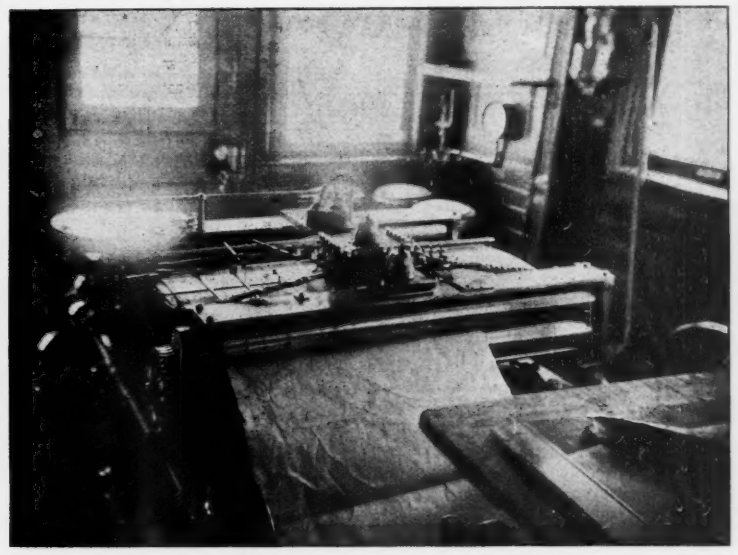


Fig. 3.

Recording Arrangement—Dudley's Dynagraph Car.

The scale of the record is so large that very small irregularities, even to the $\frac{1}{64}$ of an inch, may be noted on the paper and their peculiar characteristics may be studied, for there is a marked difference in the character, the causes and the effects of undulations in rails.

It may be that not all the information these diagrams are capable of giving has yet been ascertained, but

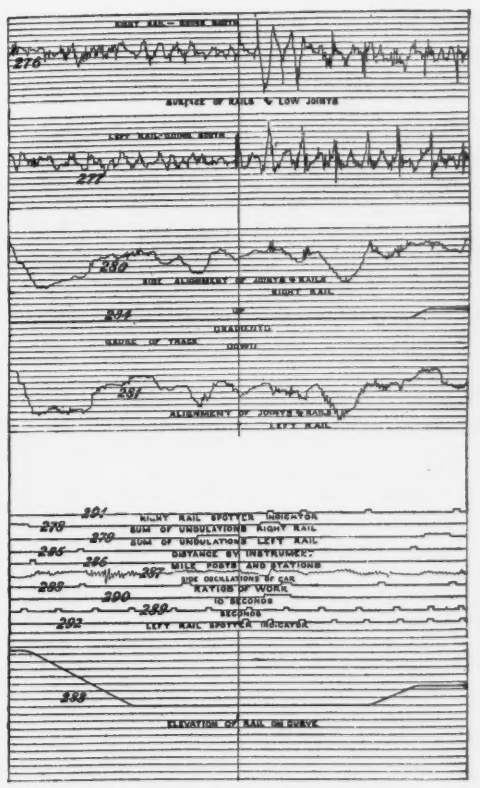


Fig. 4.—Track Record from Dudley's Machine.

This cut is much reduced from the original as recorded in 1882. Now the lines "surface of rail and joints" and "side alignment of joints and rail" are nearly straight on the Boston & Albany and other heavy modern rail.

the analysis of a long series of these curves, supplemented by experiments undertaken to verify deductions from the observed characteristics, have shown beyond a doubt, [1] that certain kinds of rails are defective when they come from the mill, being full of small irregularities of surface which have a hitherto unsuspected effect on the life of the rail and on the smoothness of the track in which they are laid, but which no amount of care or labor on the part of the trackmen can ever quite remove—to produce a perfect track with such rails is impossible—

(*Continued on page* 892.)

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

One of the most interesting of recent events in railroad finance is the declaration of a dividend on the preferred stock of the Northern Pacific at the rate of one per cent. quarterly, or four per cent. per annum. And one of the most amusing features of this event is the hasty crediting of Mr. Hill with all that has made this possible. No doubt Mr. Hill himself laughs at the Wall street financial writers who say:

"The present managers of the Northern Pacific have profited by the experience of their principal competitor and have taken a good many leaves out of Mr. Hill's carefully compiled and very complete book. It is well known that in this matter the managers of the Northern Pacific have had the co-operation and hearty good will of Mr. Hill. This is the real secret of the Northern Pacific's re-entry into the list of dividend payers."

This is like giving the Republican party credit for dollar wheat. Of course, recent heavy gross earnings have been greatly the result of circumstances which no railroad administration and no political party could control or even influence; but the improvements which have made it possible for the Northern Pacific to do business at a profit are due mostly, we judge, to three men, Mr. Kendrick, Mr. McHenry and Mr. Winter. We mention Mr. Kendrick and Mr. McHenry first, not because their work has been more important than that of Mr. Winter, but because their work came before his in order of time. And, naturally, all of these gentlemen must have had the support of those who controlled the finances of the road; so the Receivers and the trustees of the voting power doubtless had their part in the preparation for a prosperous future. But we judge that to the three executive officers whom we have named should be ascribed the chief credit for the great improvement in track, equipment and organization which has made the Northern Pacific an efficient machine for transportation. These improvements began long ago—long before Mr. Hill had any control of the property—but no doubt his example is to be counted in the sum of the influences; but so must be everything else that has gone to add to the knowledge and skill of the gentlemen who have made the change. It must not be forgotten that Mr. Winter handed over the property only last September, and that he confidently predicted four per cent. to the shareholders.

Locomotive Testing at Purdue University.

In our issue of May 14 we briefly outlined the work which had been done on the Purdue testing plant with the first locomotive, Schenectady No. 1. As related to the description in this issue of the new engine, it may be of interest to recall some incidents of the past few years which have led up to the present equipment for locomotive testing at Purdue.

To Professor Goss is due the credit for designing and installing the first permanent locomotive testing laboratory. This was completed and put in operation in 1891 in the building used as a mechanical laboratory. The successful working of the plant soon attracted the attention of engineers to this method of testing locomotives for efficiency, and for studying the effect upon the economy of variations in the manner of working.

In 1890 the American Society of Mechanical Engineers appointed a Committee on Tests of Locomotives, which later reported in favor of shop tests as the only kind of locomotive tests which could be relied on, in certain cases, to give accurate information. The Committee's report was adopted by the Society and the Committee was continued. A committee on the same subject was also appointed by the Master Mechanics' Association, the two committees to confer together. The working of the Purdue testing plant was watched carefully, and it was decided that the results to be obtained from that apparatus were really useful and satisfactory. In 1893 both committees recommended to their associations that a series of locomotive tests be conducted at Purdue University under the auspices of the two associations, the University having offered the use of all its laboratory apparatus free of charge. Both associations approved the proposed tests, and the project was then presented to the American Railway Association with a view to raising funds for carrying on the work, but that Association did not think the time opportune to take up the subject. An attempt was then made to obtain the necessary money by subscriptions from the railroads, but this effort also was unsuccessful, probably largely because of the very serious depression in railroad earnings.

The importance of shop tests was fully appreciated by those having this matter in charge and the work as outlined by the Master Mechanics' Association Committee covered tests on simple and compound engines to determine the relative efficiencies under various conditions of steam pressure, speed and load. It was intended to use the 17-in. × 24-in. engine, Schenectady No. 1, and a 20-in. × 24-in. 10-wheel engine, converting them into two-cylinder compounds after testing each as a single expansion locomotive. For convenience in moving engines to and from the testing plant it was proposed that the apparatus be moved from its position inside the mechanical laboratory to a new location in a detached building.

While the plans of the Master Mechanics' Association were never carried out, circumstances have since arisen at Purdue which have led to an equipment of the plant almost exactly as was intended for the Master Mechanics' tests. The original plant was destroyed by fire in January, 1894, and in rebuilding, the new plant was placed in a building outside the general laboratory and connected by a switch track with the Lake Erie & Western Railroad. The new foundations were also extended and provision was made for testing 10-wheel as well as eight-wheel locomotives. The new locomotive, Schenectady No 2, has a boiler capable of carrying a working steam pressure of 250 lbs. per square inch, and is so designed that the cylinders can readily be changed to give wide ranges for both simple and compound working.

The relative economy of simple and compound locomotives, and the effect of high steam pressures, speeds and loads upon the economy of simple and compound engines can now be accurately determined for the first time in a scientific manner. In addition to these problems, accurate information may now be hoped for regarding the best cylinder ratio for compound engines, the effect of different valve settings and the lubrication of the valves under high steam pressures. It will, therefore, be seen that the tests proposed by the Committee of the Master Mechanic's Association three years ago are now about to be carried out by Professor Goss.

But little more is known about these subjects than was known three years ago, and the data obtained from these shop tests will be of great value and will probably go a long way toward settling the much disputed question of the relative economy of compound and simple locomotives.

Further Discussion of Traffic Pools.

Last week we briefly discussed the present aspect of the movements for and against the abolition of the fifth section of the Interstate Commerce law, noting the different motives of railroad managers in different sections of the country and the increasingly active opposition of Western merchants. Since that writing the Kansas City Transportation Bureau has formally voted to oppose any legalization of pooling. In this issue we give abstracts of two of the clearest utterances on the subject that have lately appeared, one by a railroad president, not named, and the other by Interstate Commerce Commissioner Prouty.

The railroad president holds that our Congressmen and Legislators have yet to be taught, by their constituents, that the railroads must, for the good of the country, be allowed to make fair incomes, and that no rational legislation can be had until the public performs this duty; and he points out the practical impossibility of securing an agreement, among even our most powerful East and West trunk lines, to raise transportation rates above a fair level.

Mr. Prouty's argument, while ignoring the glaring inequalities between the rates to big shippers and those to small ones which now prevail and which no one has been able to cure, and while weak in its Missouri River-Chicago illustration, still presents the sharpest criticism of the railroad position that has appeared for some time.

One of the older Senators has said that the Senate is pretty evenly divided, and that, therefore, there is little hope of the passage of any modification of the present law. Whether this be the correct view or not, there is no doubt that many members of both houses are far from holding very determined views either way; and, this being so, committee hearings and discussions ought still to be profitable. If there is any prospect of securing the repeal of the fifth section, it is not clear why railroad interests should relax their efforts to get it repealed. It is true that the anti-trust law, as last construed by the Supreme Court, would still prevent conferences looking to the maintenance of rates, and so would, probably, prevent the formation of pools; but the anti-trust law may not always stand, and the Supreme Court may, possibly, find some way of taking back part of its dictum.

Mr. Prouty simply aims to show that the railroads, if allowed to pool, will surely raise rates wherever they can, and that under present laws the Interstate Commerce Commission cannot prevent such increases. On the other hand, the railroad president quoted is afraid to give the Commissioners any power at all, though apparently he would, with Mr. Milton H. Smith, be willing to let them supervise the rates of freight actually pooled. Mr. Prouty evidently believes the Foraker bill too lenient, leaving the railroads too much power; while the railroad president asserts that commercial forces—the competition of the world—will compel the railroads to use their power in the interest of economy, which means the true interest of the public.

This question—how the government shall manage to keep its hand constantly on the brake-lever—seems to be the principal point at issue; and both sides being pretty well agreed that any new law must provide for some regulation of this kind, why not compromise by limiting the number of months or years for which pools may be made? This could be done either by statute or by the act of the Commission. For that body to attempt to examine and approve all rates before approving a pool is a practical impossibility, as Mr. Blanchard has shown. There are so many thousands of rates that it would be out of the question to give reasons for approval or disapproval, except in the most vague and general way, and the Commission might as well approve or disapprove absolutely, without giving its reasons. Unconditional approval, for six months, of a pool at Chicago or Kansas City, for instance, could not destroy many towns or farms; and a little actual experience might serve to show to Congress and the farmers the truth or falsity of the railroads' claim that rates would not be unjustly advanced. If a pool for a limited period proved advantageous to the railroads they could be depended upon to present their reasons, if required, why it ought to be continued longer. Any kind of provision for approval by the Commissioners places the whole matter absolutely in their hands, for if they decline to give their approval, the appeal to the courts, if such appeal is provided for, will take so much time that the privilege will probably be worthless.

Mr. Prouty lays stress on the violation of law by the trunk line railroads, and thinks that if they will now defy the law they would, with power to pool, defy the public interest and ignore it in making rates; but he ignores the fact that the public interest compels recognition of itself. The great leveling forces, worldwide competition, the constant tendency of capitalists to build new railroads as soon as the old ones begin to make money, and the incessant demands of cities and towns for assistance against cities and towns on other roads will press the railroads just as hard when business is pooled as they do now. The irrepressible energies of the great army of traffic managers and solicitors also constitute a factor to be dealt with. As we have said many times already, pools do not kill out the competitive spirit. English railroads find ways to compete, which are very evident to shippers, even where pools are in existence.

But whether the railroads are or are not such lawbreakers as to have no standing before Congress, th people have a standing there, and the people nee pooling for their own benefit. Shippers need stable rates rather than low rates. Various forces, those ust mentioned, for instance, tend to keep rates

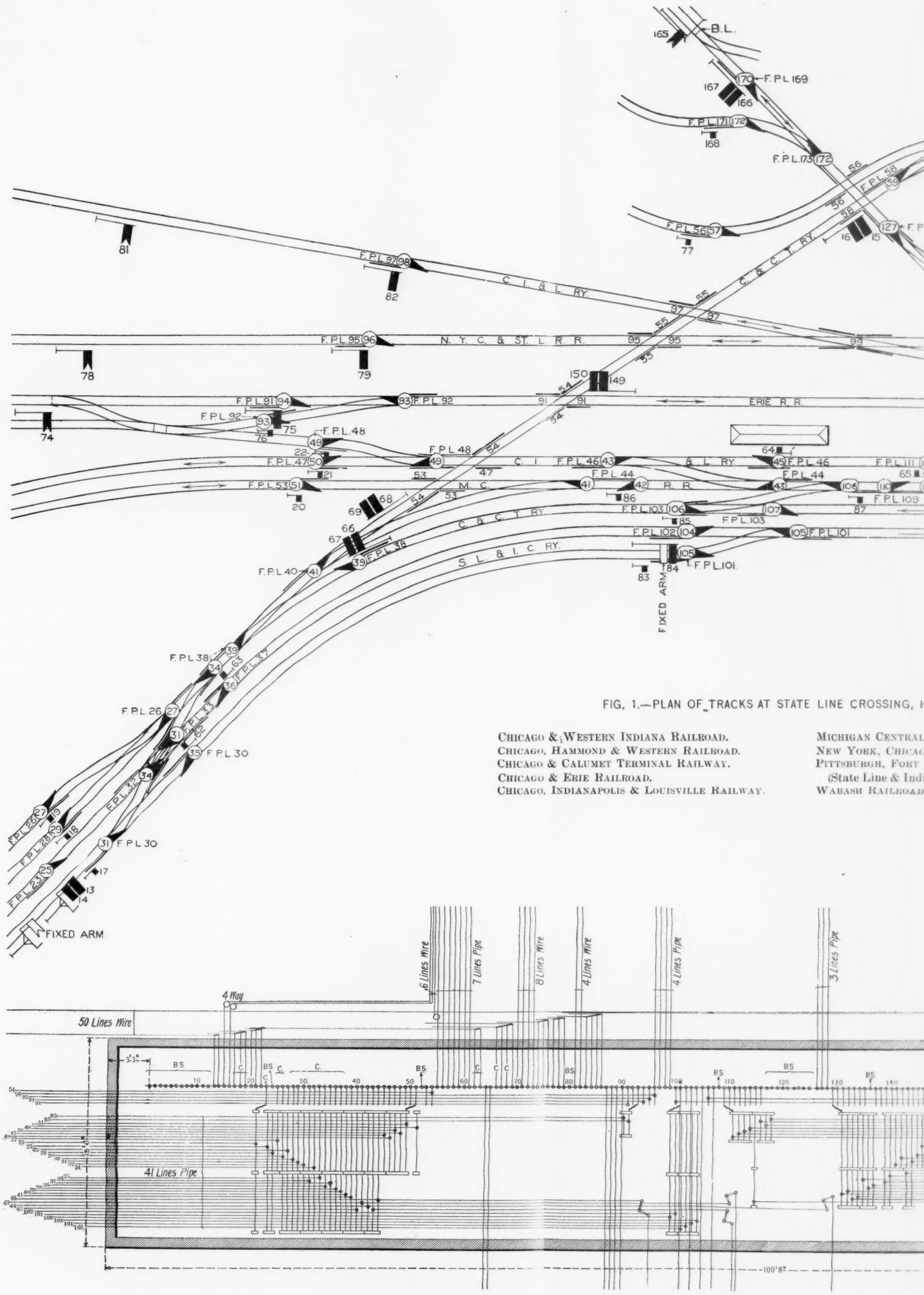


FIG. 1.—PLAN OF TRACKS AT STATE LINE CROSSING, H

CHICAGO & WESTERN INDIANA RAILROAD.
CHICAGO, HAMMOND & WESTERN RAILROAD.
CHICAGO & CALUMET TERMINAL RAILWAY.
CHICAGO & ERIE RAILROAD.
CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY.
MICHIGAN CENTRAL
NEW YORK, CHICAG
PITTSBURGH, FORT
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WABASH RAILROAD

FIG. 2.—INTERLOCKING SWITCHES AND SIGNALS AT STATE LINE CROSSING, H

By the NATIONAL SWITCH AN

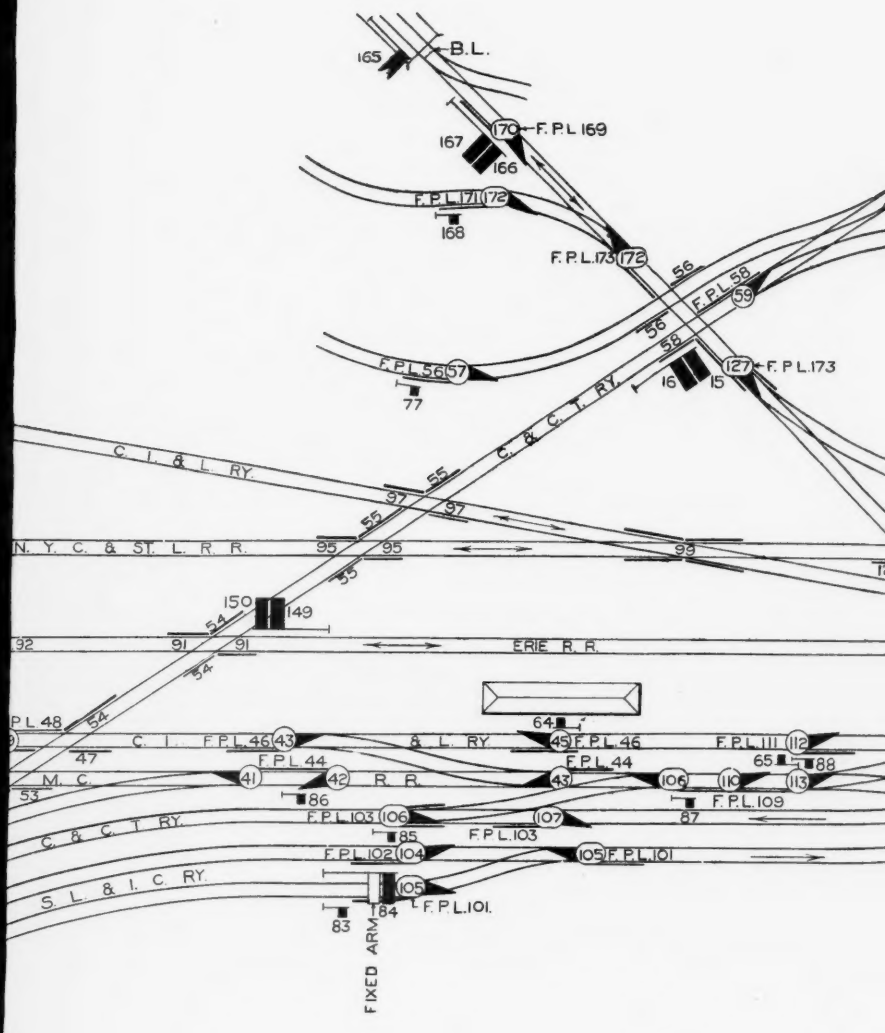


FIG. 1.—PLAN OF TRACKS AT STATE LINE CROSSING, HAMMOND,

CHICAGO & WESTERN INDIANA RAILROAD.
CHICAGO, HAMMOND & WESTERN RAILROAD.
CHICAGO & CALUMET TERMINAL RAILWAY.
CHICAGO & ERIE RAILROAD.
CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY.
MICHIGAN CENTRAL RAILROAD
NEW YORK, CHICAGO & ST. L
PITTSBURGH, FORT WAYNE &
(State Line & Indiana City.)
WABASH RAILROAD.

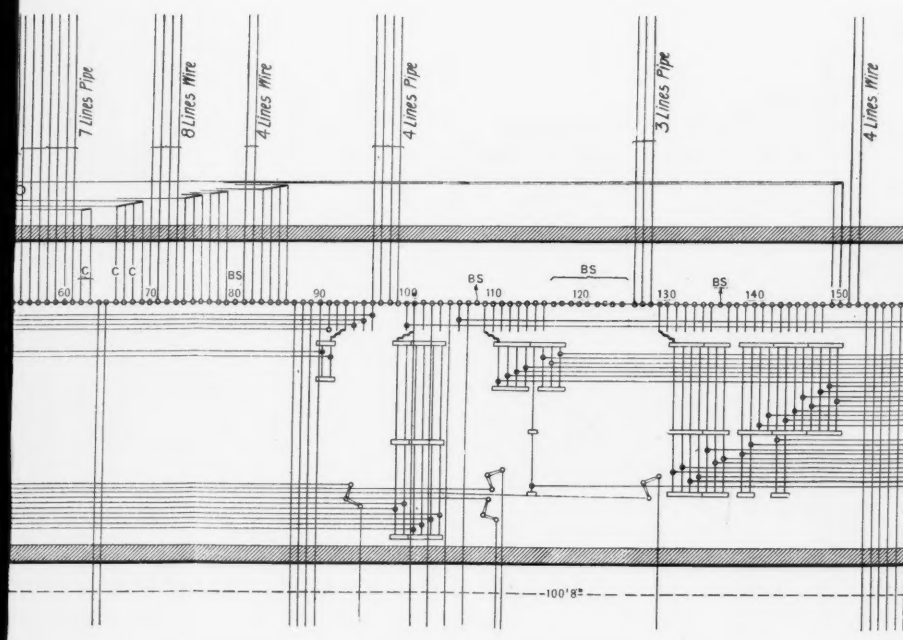
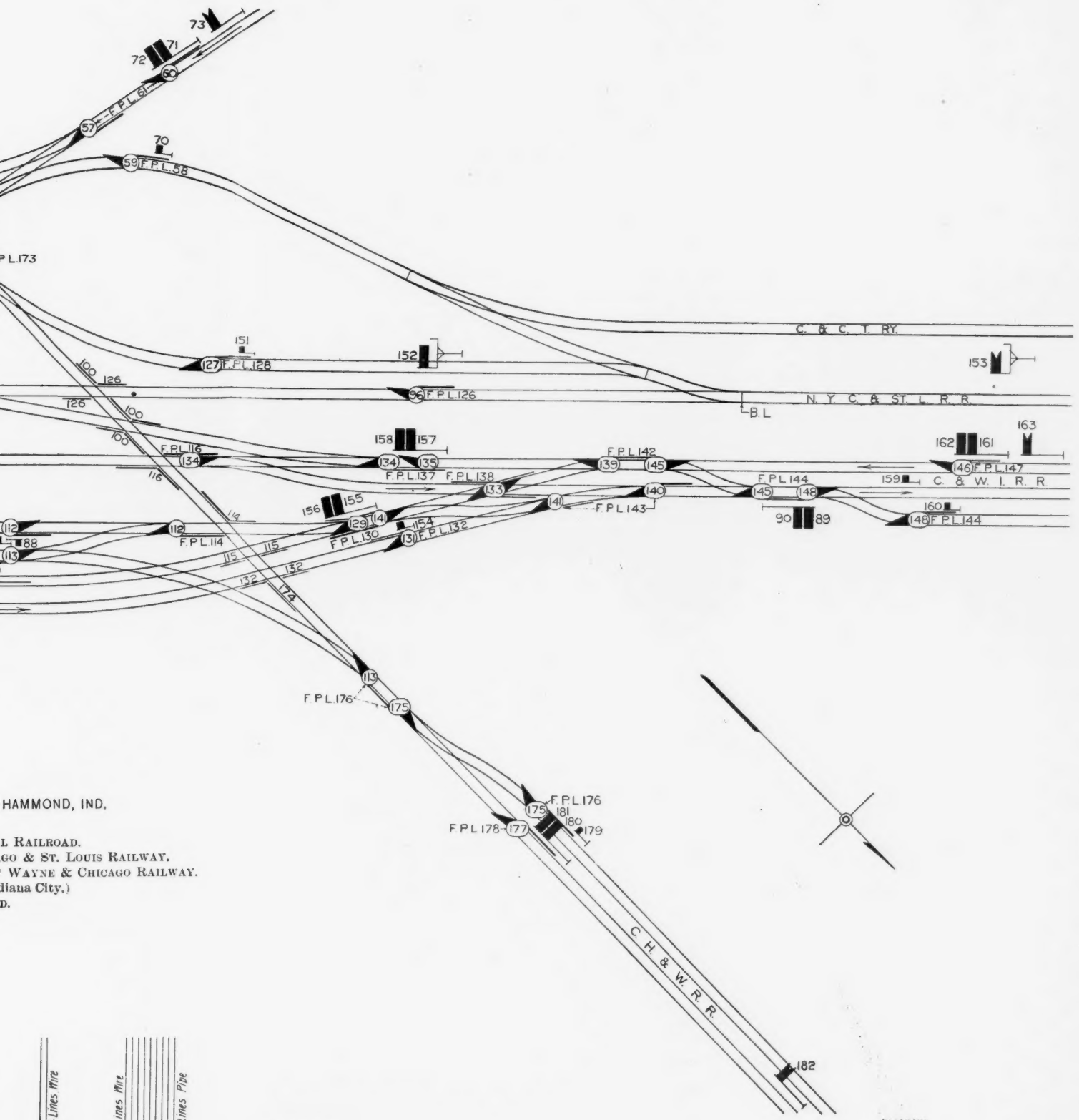


FIG. 2.—INTERLOCKING SWITCHES AND SIGNALS AT STATE LINE CROSSING, HAMMOND,

By the NATIONAL SWITCH AND SIGNAL C



HAMMOND, IND.

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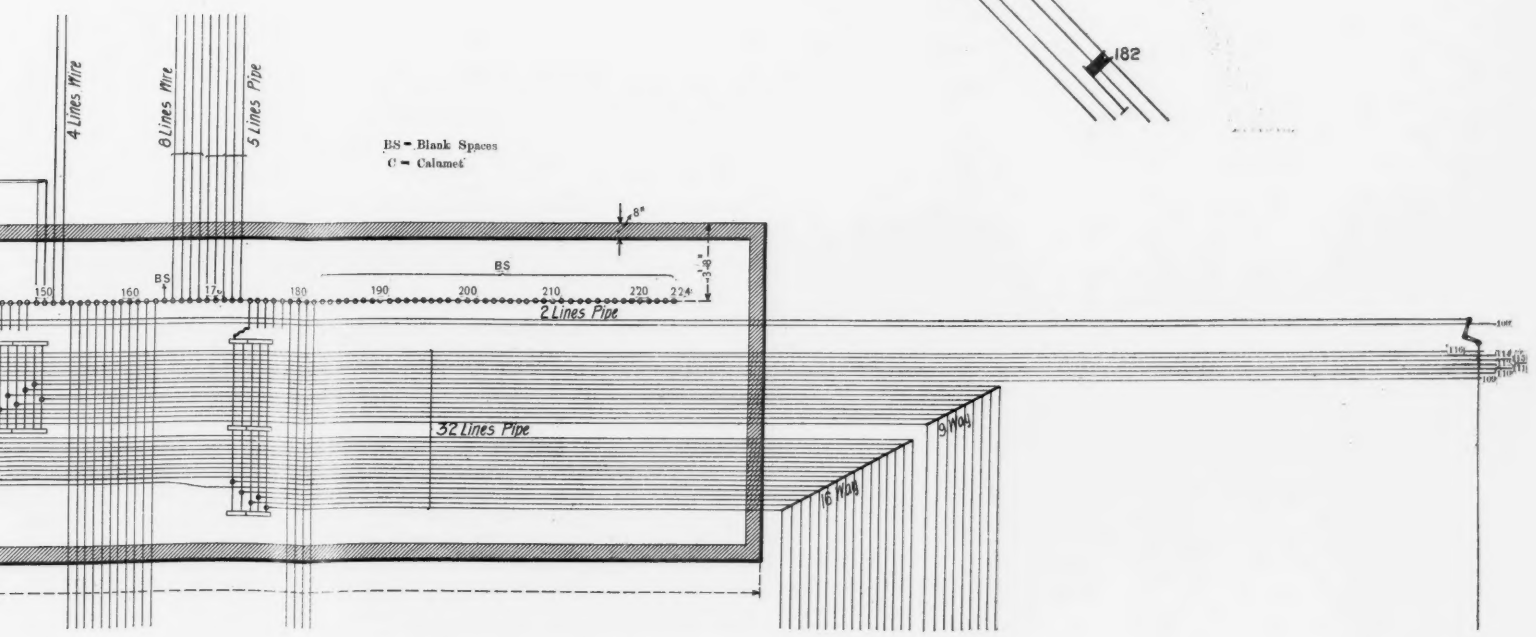


HAMMOND, IND.—DIAGRAM OF LEAD OUT CONNECTIONS IN FIRST STORY OF TOWER.

ND SIGNAL COMPANY, *Easton, Pa.*

down; but no one knows of anything, except pools, to keep them stable. Shippers who refuse to join in a demand for stable rates are open to the suspicion that they are making undue profit out of demoralized rates. The people have a vital interest in maintaining respect for the law, but the only way in which they can aid honorable railroad men in compelling their reckless competitors to respect the law is by abolishing the probibition of pooling. Pooling contracts compel the reckless rate-maker to put his promises in writing, in such a shape that they have to be kept.

Nickel Steel Forgings.

While the use of nickel steel forgings for certain important parts of heavy stationary and marine engines has become quite general, yet only occasionally do we hear of nickel steel being used for locomotive crosshead pins, crank-pins piston rods and driving axles. It is conceded by the best authorities that from nickel steel, properly worked, forgings of such parts can now be made which greatly excel similar forgings of all other materials in elastic strength and in toughness.

Probably the cause for this delayed introduction may be found in the greater cost of nickel steel, the greater cost of working and the comparatively short time this material has been successfully made. Also, until quite recently an opinion prevailed that steel forgings generally were unreliabie. This was due largely to the poor work turned out in the beginning at some of the steel forges, and unfortunately some of these concerns are still at work furnishing material of an inferior grade at unreasonably low prices. However, certain steel forges, by improving facilities and processes, have made a well-deserved reputation for the quality of their high-grade steel forgings, and in this way have done much toward the introduction of this material in machinery construction. While the prejudice against steel forgings is fast disappearing among better informed engineers, there remain a few, especially in the West, who prefer iron to steel on account of "fiber." There seems to be no good reason for this preference, as so-called "fiber" is due to the presence of cinder in the iron, which cannot be a desirable constituent of a forging which depends upon the soundness of its welds to hold it together. The true reason for this preference is likely to be found in the fact that wrought iron will endure all kinds of abuse of work and heat treatment and show no bad effects, while steel is quickly injured by the bad handling of ignorant workmen.

To a user of steel forgings, the details of the various processes used in their manufacture may be matters of interest, but not of great importance. There are, however, some features in connection with the manufacture which, if neglected, affect so greatly the quality and soundness of steel forgings that the purchaser should know of these so as to better enable him to judge between good work and poor work.

Much useful information on this subject is given in a paper on "Steel Forgings," by Mr. H. F. J. Porter, before the Western Society of Engineers, Oct. 7, 1896, and noted in the *Railroad Gazette* at the time. The paper deals with the methods and latest practice of the Bethlehem Iron Works in forging high-grade steel. According to Mr. Porter, such forgings are made from fluid compressed, acid open-hearth steel, and are carefully annealed after forging. A steel forging should be made from a steel casting larger than the finished piece, as steel possesses the property of welding to a very limited extent. To get the best results it is necessary to use an ingot twice the diameter of the finished forging to be made from it, in order that the proper amount of work necessary to make it a forging shall enter into the metal during its reduction in size under the press. The ingot also must have from 30 to 50 per cent. extra metal at its top, which is cut off and returned to scrap as it contains a cavity or "pipe" formed at the top due to shrinkage and it also has near the top a centra core of impurities. For these reasons, only the lower portion of the ingot is solid and suitable for forging purposes. In the process of forging the pressure should be sufficient and of such a character as to penetrate to the center and cause flowing throughout the mass. This flowing of the metal requires ti and the requisite pressure should be maintained throughout a corresponding period. For this reason powerful hydraulic presses have replaced hammers for this work. Wherever the form and size of forgings will allow of such treatment, they should be made hollow and may be oil-tempered; while this increases the cost of the forging it greatly increases the physical properties of the metal. Hollow forgings should always be made from solid ingots, the center of which has been removed by boring. Careful annealing should always be insisted upon.

Breakages of crankpins and piston rods of locomotives have caused mechanical men to seek a metal of high elastic limit and elongation which will successfully resist the severe alternating stresses to which they are subjected. When steel was first substituted for wrought iron in locomotive crankpins, a soft, low carbon steel was generally used approaching iron, as regards physical qualities, and failures due to "fatigue of metal" were almost as frequent as before. The broken pins showed what has been called "a fracture in detail," a general parting of the steel extending inward all around the piece, doubtless produced by the working stresses repeatedly approaching the low elastic limit of the soft steel. The average elastic limit of wrought iron is about 20,000 lbs. per square inch where care is taken in its production. On substituting a higher carbon steel with an elastic limit of 45,000 to 50,000 lbs. per square inch failures were greatly diminished without changing the diameter or shape of the pins. Steel of still higher elastic limit and proportionately greater elongation gives correspondingly better results, and for this reason the use of nickel steel is being recommended.

The following figures are taken from Mr. Porter's paper, which indicate the physical characteristics of various steels used to resist alternating stresses.

Mild steel suitable for connecting rods, where the amount of machine work in finishing is very great, and where there is an ample margin of safety in the design, should contain from 0.20 to 0.25 per cent. of carbon and show, in specimens four diameters in length, a tensile strength of not less that 57,000 lbs. per square inch, an elastic limit of not less than 27,000 lbs. per square inch, and an average elongation of 25 per cent.

For the general run of engine forgings where little machine work is required, it is advisable to use a higher carbon steel with a tensile strengh of about 75,000 lbs. per square inch, and elastic limit of 35,000 lbs. per square inch, together with an average elongation of 20 per cent. in four diameters.

For such parts as crankpins, crosshead pins and parts of machinery subjected to severe alternating stresses and wearing action, a still higher grade of steel is recommended. Such steel should have a tensile strength of about 85,000 lbs. per square inch, an elastic limit of about 40,000 lbs. per square inch, and an elongation of 15 per cent. in four diameters. If such forgings are tempered, the tensile strength will become about 85,000 to 90,000 lbs. per square inch, elastic limit 45,000 to 55,000 lbs. per square inch and the elongation 15 to 20 per cent. By introducing about 3 per cent. of niokel into steel, a finely granular condition results and a high quality of steel is obtained. By hollow forging and oil-tempering nickel steel a material is obtained excelling all others known in elastic strength and toughness. Such forgings were used for the crosshead pins, crankpins and axles of the new Purdue locomotive, Schnectady No. 2, while the piston rods of this engine were of the same material, but forged solid. Test bars of this material ½ in. in diameter and 2 in. between measuring points showed the following physical characteristics:

Tensile strength	91,000 lbs. per square inch
Elastic limit	57,000 " " " "
Elongation	25.05 per cent.
Contraction	56.45 " "

Without going too deeply into this interesting subject, it would be well to note how the physical characteristics of steel are affected by varying the percentage of nickel. In a paper on "High Grade Steel" before the Detroit Engineering Society, June 19 1896, Mr. J. C. Danziger states that tests which he has made of nickel steel hardened and annealed showed the following results:

	5½ per cent. nickel.	27 per cent. nickel.
Tensile strength, pounds per square inch	127,000	100,000
Elastic limit, pounds per square inch	117,000	47,000
Elongation, per cent.	21	47
Contraction, " "	61	61

It will be noted how wide a range of qualities is thus obtained. The 27 per cent. nickel steel will not rust even in salt water, and may be bent after nicking without breaking. In general the lower percentages of nickel raise the tensile strength, elastic limit, extension and contraction of steel and increase the ratio of elastic limit to tensile strength and of contraction to extension.

It is also shown in this paper, by the results of tests, that the addition of nickel greatly increases the hardening effect of steel; the hardening effect in turn raises the tensile strength and the elastic limit, but reduces the extension and contraction so much as to necessitate a partial re-annealing.

For locomotive crank-pins, crosshead pins, piston-rods and driving axles, there is no doubt that nicke steel is the best material now available. We are informed that one railroad in the West is now experimenting with nickel steel locomotive stay-bolts, while another intends to try nickel steel plates in boiler construction.

On account of the care which must be taken during the various processes of manufacture to produce nickel steel forgings of the best quality, it is a matter of the first importance that such high-grade material be purchased, under rigid specifications, from those who are experienced and have proper facilities for doing the work. There seems to be reason to believe that as the properties of this material become better known and appreciated by railroad mechanical men its adoption will be quite general for such parts of a locomotive as are subjected to severe alternating stresses and wearing action.

Brake Hanging and Efficiency.

Mr. Parke's important paper on hanging brake-shoes was printed by abstract in the *Railroad Gazette* of Nov. 19, page 815. It now appears in full in the pamphlet proceedings of the New York Railroad Club, and is available for careful reading by those interested. The paper is pretty long, but it is well worth reading in full. A correspondent has said: "Very few will read this paper who have not a fair understanding of the elementary principles of applied mechanics, and the first 15 pages, with the exception of a few short statements, could have been omitted entirely." Our correspondent is young and his technical school knowledge is still fresh in his mind. He probably overestimates the command of the underlying principles of mechanics which the average man in practice has. We judge that a great many of our readers will be glad to get Mr. Parke's statement of the mechanics of the question. No one can reason correctly on the matter unless his fundamental conceptions are not only correct, but clear. For the benefit of those who did not read our abstract of the paper, and who have not the time or the mental energy to read the paper as it now appears, we sum up as briefly as possible the main points brought out.

It is claimed that by a simple modification of the common mode of hanging brakebeams, trains can be stopped in from 10 to 15 per cent. shorter distances; this is demonstrated by an analysis of the various elements entering into the problem of stopping an empty car from speed.

The principal points brought out are that during any application of the brakes the retarding force tends to rotate the car body about an axis through the center plate of the front truck; in the same way each truck tends to rotate about an axis through the points of contact of the rails and the forward pair of wheels. The first tendency is necessarily accompanied by a transfer of a certain portion of the normal weight of the car body from the rear truck to the forward truck. Also there is similar transfer of a portion of the normal weight from the rear pair of wheels to the forward pair of wheels of each truck. The last pair of wheels of a car therefore carries a smaller weight to the rails than any of the others. Investigation indicates that the amount of weight transferred from the rear to the forward truck is not ordinarily very great, but the transfer is greater where the car body has a high center of gravity and also where the distance between truck centers is comparatively short.

To get the highest efficiency of the brakes, the pressure on the brakeshoes should be proportioned to suit the weight carried by each particular wheel during an application, the present practice being to design the brake gear so as to get the same pressure on all brake-shoes. The fault in present practice is that if the brake-shoe pressure is just sufficient not to skid the last pair of wheels of a car, it will not be the maximum permissible pressure for the forward wheels.

Mr. Parke proposes to make the brakeshoe pressure of the wheels of the rear truck proportional to the pressure of these wheels on the rails, during an application, by an adjustment of the inclination of the brake hanger. This adjustment decreases the brakeshoe pressure on the rear wheels and increases the brakeshoe pressure on the forward wheels of the rear truck, regardless of the direction in which the car is moving. It is evident that in this way it may be theoretically possible to correctly proportion the brakeshoe pressures of the rear truck. But there is always the additional weight on the front trucks, due to the transfer of a portion of the normal weight of the car body, during an application, which is not made use of for braking purposes.

It is found that to realize the advantage of the principle of inclined brake hangers the brakes must be inside hung. Another advantage of inside hung brakes is that the hangers of the rear beam pull downward, while the hangers of the forward beam push upward, thus tending to diminish the tilting of the truck. Also, release springs are not needed when the hangers are inside, as the weight of the brakebeams and attached parts tends to swing the brakeshoes away from the wheels.

Calculations show that with inside brakes the efficiency of the brakes is increased from 20 to 25 per cent. by adjusting the hangers, but it is stated that such remarkable increases cannot be realized in practice, as it is impossible to maintain any particular angle of inclination of the brake hangers on account of the wear of

the brakeshoes and wheel treads and the lost motion in the pedestals. These causes would have but little effect on the angle of inclination, but for the short hangers, and it is recommended to use brake hangers from 16 to 22 in. long with the lower end as near the center of the brakeshoe as possible.

The appendix is valuable, a car with inside brakes being there considered at length, resulting in formulæ for the load on each truck during an application, the wheel pressures and brakeshoe friction for the wheels of the rear truck, the proper angle of inclination of the hanger, the horizontal pull of the brakebeams and the calculated braking force corresponding to the angle of inclination.

Great activity characterized the course of the bond market last week; for the six days ending Saturday the total sales aggregated $20,270,000 against $15,485,000 the previous week. In addition to buying by savings banks and corporations, among the latter the big insurance companies, there was a good demand from the West and from the speculating public. There has been more interest shown in second class issues or those bearing five per cent. or more and selling below par, as well as those that do not pay anything, than at any time since last spring, which is the logical course of a buying movement after it develops in the bond market; but despite the speculative character of many of the transactions, buyers are very discriminating. The buying reflected a certain study of conditions, general and specific, affecting various properties, and for this reason perhaps bonds of roads which are showing large increases in earnings, like Northern Pacific, the Grangers and Trunk Lines, are in the best demand, while properties adversely affected are somewhat of a drug; among the latter may be classed the coalers. A development as reflecting the attitude of buyers was the bids made for $6,243,070 gold bonds and stock of the city of New York opened on Tuesday. The aggregate of bids was $24,000,000, and the average price was considerably over 105. As high as $107,577 was bid for $1,750,000 of the dock bonds. The bidders were among the strongest financial houses in Wall Street. It was semi-officially stated that the bond and stock requirements of the Union Pacific under reorganization would be considerably less than was naticipated. This was reflected in higher prices for the various securities of that company. If the market continues to broaden announcements of new issues of importance are likely to appear. Centers of activity have been the Atchison 4's, Erie liens, Lake Shore 2ds, Louisville & Nashville 4's, Metropolitan Street Railway 5's, Missouri Pacific consols, Northern Pacific 3's and 4's, Oregon Short Line bonds, Oregon Railway & Navigation issues, Southern Railway 5's, Texas Pacific 2ds, Wabash 1sts and the various Granger issues.

In Denmark, near Copenhagen, there was a collision July 11 last by which 32 passengers were killed instantly, eight others were hurt so that they died afterward, and about 70 others were injured, many severely. A fast train ran into one standing at a station, though the signals were properly displayed. The engineman claimed that he did not see the signal lamp until he had run some 2,500 ft. past the place where he should have first seen it, that he then applied the vacuum brake, but that it would not go on strong, and that this upset him so that he forgot to signal the brakeman to put on brakes, though he reversed the engine. The man has been tried recently and sentenced to imprisonment for four months and to pay the State (which works the railroad), $12,116, a little more than half of it on account of damage done railroad property, and the rest to reimburse the State for payments to the victims or their relatives.

The Belgian Minister of Railroads has announced his intention to do away with one class of passenger accommodations. Nominally it is the second-class that will be abolished, and the fares in the first-class cars are to be made the same as the present second-class cars. As only a very small proportion of the first-class accommodations are taken there is no doubt that this will be profitable to the railroads, and the same policy would be advantageous probably on most European railroads; though there are certain routes where the first-class cars are well patronized and pay well. The universal provision of first-class accommodations, together with two other classes, has resulted generally in giving first-class passengers more than they pay for.

Under the law punishing the crime of "wilfully or negligently endangering railroad transportation" 838 persons were tried by criminal courts in Germany in 1894, and 823 in 1895. The number tried for "wilfully" committing this crime was 61 in the two years, 41 of whom were found guilty. No less than 24 of these were less than 18 years old. Fifteen of the condemned were sentenced to imprisonment, and four of the sentences were for five years or more. Of the 1,600 tried for criminal negligence in the two years, 1,048 were found guilty; of these only 37 were less than 18 years old.

NEW PUBLICATIONS.

Year Book of Railway Literature. Compiled and edited by Harry Perry Robinson. Chicago: *Railway Age*, 1897.

The editor says that "the object of the publishers of the Year Book of Railway Literature is to put annually into permanent form all papers or addresses on the public relations of railroads, appearing or being delivered during the year, which seem to have enduring value. Accordingly, he has collected in this volume of 428 octavo pages a number of occasional papers, addresses, etc., which have been published in many different places. For instance, the volume begins with seven papers by Mr. Blanchard, reprinted from the New York *Mail and Express*, on the general subject of pools. Papers by Mr. Walker, Mr. Thomas, Mr. Jeffery, Mr. Ingalls, Mr. Ripley and half a dozen others follow Extracts from the pungent remarks of Mr. Blackstone in his annual reports also find a place in the volume, as do extracts from the annual reports of Mr. C. P. Huntington. An index of six pages makes the collection available for consultation, as otherwise it could not be.

The idea underlying this collection is an excellent one. The only other way to preserve these papers and make them accessible is to carefully cut them out and file and index them by some method, which very few men have the patience or the organization to do, and even then they are nowhere near as convenient for use and preservation as in a bound and indexed volume. We hope that Mr. Robinson's venture will prove so profitable that he will be encouraged to go on with the work from year to year.

Aluminum and Aluminum Alloys. The Pittsburgh Reduction Co., Pittsburgh; 265 pages, 3 × 5 in. Price, $1.50.

The reader will find in this book accurate information regarding the properties of aluminum, together with reference to the present state of the art of its manufacture, some of the facts stated being the outcome of careful and systematic investigation by the Pittsburgh Reduction Co. In the first part, the physical properties of the different metals, the specific gravities of the alloys of aluminum and the electrical conductivity of different substances are carefully arranged for reference and concisely treated. The book is not confined alone to the mere discussion of the properties of aluminum and its alloys, the last portion being devoted to tables of the weight and strength of the different forms of aluminum, placed on the market, to many conversion tables and other classified information of value to engineers. The discussion of aluminum in cast iron and other metals should prove serviceable. A complete table of contents and an extensive index add to its value. This catalogue has cost the company a considerable amount of money to compile and publish in the complete form in which it is now being sent out, and in order to make it accessible to many a moderate price has been placed on each volume.

The Indian and Eastern Engineer Diary for 1898. London, 50 Fenchurch street; Calcutta, 137 Canning street.

The publishers of the *Indian and Eastern Engineer* issue a diary which is presented yearly to subscribers, the appearance of which we have noticed in years past. It has some special features that make it interesting to an American reader, and of course valuable to those who have occasion to use it in India. The monthly calendar is full of dates important in the history of India, as for instance the Cabul massacre, Jan. 7, 1842; the siege of Lucknow, March 8, 1858; revolution at Delhi, Aug. 2, 1788, and so on. To a good many of us the important dates in Indian history have had a stirring and romantic interest for many years, and recently Kipling has given them an interest such as they never had before. Another singular feature is the Hindoo holidays, Mohammedan holidays and the set of Mohammedan, Bengali and Samvat calendars. The book contains a directory of the Indian government and Provincial governments, a railway directory covering India, Japan, Java, the Malay Peninsula, Philippine Islands, Siam and Sumatra, and other useful information.

The Traveling Engineers' Association. Proceedings of the Fifth Annual Convention, September, 1897. Edited by the Secretary, W. O. Thompson, Elkhart, Ind.

This volume contains a list of officers, the constitution, by-laws and names and addresses of members, and the papers and discussions presented at the convention. The committees for 1898 and the subjects for discussion are also given. These subjects cover lubrication, the instruction of firemen, coal economy, signals, the Brown system of discipline, air-brake instruction, cab fittings and the air-pump and engineer's valve.

The Annual Inspection of the Boston & Albany Railroad.

(*Continued from page* 889.)

[2], if the track be neglected and allowed to become considerably uneven, the rails take a permanent set, which can never be entirely got rid of, no matter how carefully the track be cared for afterward; [3], the importance of sound ties and a firm ballast under the rails, particularly at the joints, is emphasized; [4], a rail combining great strength and stiffness, with a broad head and a broad base, made from steel containing a large percentage of carbon, and of much harder texture than formerly, if properly laid and looked after, makes a track far superior to the narrow, soft-headed rails; also such a track requires much less labor to keep it in order than the other.

But perhaps the most important of all the information long study of the dynagraph diagrams has ever given is that a first-class railroad track is not the work of a few weeks or months in a single summer, but of patient, well-directed labor for a term of years; that a track newly laid does not come to its best condition in less than two or three years, after which a very moderate amount of labor will suffice to keep it in order, provided only that it be done at the time when it is needed. Were it generally understood to what varied and profitable uses these diagrams may be put, track inspection by this method would be the general rule, especially as the results, intelligently applied, would show in a short time a marked improvement in the track, and a reduction in the cost of maintenance, because the work can be done exactly where needed, and the whole of it be made useful.

The Cost of Fads.

At this week's meeting of the New York Railroad Club Mr. R. C. P. Sanderson presented a paper under the title of "Fads, Customs and their Cost." Extracts follow:

The object of this paper is to show that it is worth while to be mean and stingy where the efficiency is not impaired thereby, and at the same time to give an idea of how the cents multiply into dollars.

Owing to the continual loss of nuts off arch bar and box bolts, it was proposed to use only one nut on these bolts with a split key under the nut. The cast washers commenced breaking by the hundreds, the pieces fell out, the arch bars bent and broke. The remedy at once proposed was to use malleable or wrought washers. All things considered, wrought washers were best, and thousands of them were stamped out of scrap under the steam hammer. More careful investigation showed that the reason why the cast washers broke was because they were not flat, but had fins and small nubbins on their flat sides, and also because of the springing of the arch-bars—by simply turning them upside-down so that the rounded sides come against the arch bar the cast washer stands without breaking and saves 92 cents per car.

For the 1,190,000 freight cars in the United States and Canada this would equal $1,172,000. Interest at 5 per cent. on this would be, per annum, $68,000.

A cylindrical 16-in. stack with a modest curved cast-iron top and not too ornate cast base, with Russia iron casing and a choke inside, costs, complete, about $15.51. A cast smokestack complete, weighing 520 lbs., can be produced for from $3 to $4, showing a maximum saving per engine of about $11.51. For the 35,800 locomotives in the United States and Canada this would mean $412,058, and five per cent. interest on this would be $20,602.90.

When the railroads of America began to realize that the old familiar diamond stacks must go, there was choice of two prototypes of front ends of engines, one known as the Smith, the other as the Hill. The former had no extension and cleaned itself; the latter had an extension and was expected to retain the cinders. It became "the thing," and has cost the railroads millions of dollars for cleaning out cinders at terminals and between terminals, as well as for loading, transhipping and disposing of the cinders. All this could have been saved without any offsetting disadvantages or costs if the Smith front, which cleaned itself, had become the thing instead of the Hill. It is estimated that 25 cents per 100 engine miles would approximate the total cost of cleaning the cinders out of the fronts, loading them, hauling them away and dumping them, which would represent over $2,500,000 per annum. This does not include the additional first cost of the extension front, which would come to about $14 per engine, or $501,200—five per cent. interest would equal, per annum, $25,060.

Combustion chambers have their uses and merits in stationary and marine boilers of certain kinds and sizes, but to shorten the flues of a locomotive boiler from 6 to 14 in., to introduce separate flue and flanged throat sheets, with the concomitant endless troubles sacrificing at the same time a hundred or so feet of valuable heating surface, all to get a 6 or 14 in. space in the front of the firebox for "combustion chamber" purposes seems like carrying a fad a little too far. This is a case where the first cost of the fad can hardly be considered, the expense being for maintenance and operation, etc.

It has been a custom from the first to house semi-elliptic springs for carrying the weights of our locomotives on the driving boxes. How much more ease of motion is there in a 30-in. semi-elliptic having 24 to 26 leaves ⅝ in. thick and 3½ in. wide, and costing close on $10, as compared with a pair of coil springs of the same capacity costing, perhaps, 70 cents? The extra cost would represent nearly $2,502,500, the interest on which at five per cent. per annum would be $125,125. A similar argument could be used with regard to tender truck springs, where the net saving would mean $1,656,824, and five per cent. per annum would be $82,841.

There is no longer any good purpose in putting headlights of the size of a small Saratoga trunk on the front of engines. All that is really needed is a front signal lamp of a distinctive character. There is a positive danger in using a very brilliant and powerful headlight, such as some of our electric friends are interested in, for the reflected glare off the surface of the switch lamp lens is often so great that it entirely overpowers the light coming from the lamp, and will show apparently white light to the engineman while the signal may be standing at red or green. For safety a runner must therefore look for the position of a target or semaphore and not trust to the lights at night. According to the nature of the country through which a railroad runs, a saving of from $6.50 to $10.50 per engine can be effected by using a 16-in. or a 12-in. headlight instead of a 23-in. headlight.

Can anyone defend the practice, now becoming gradually obsolete, of fancy painting and gilding of locomotives? A modest legend of 15 letters, giving the name of the road on each side, would cost for gold leaf and labor $4.60; in chrome yellow paint the labor and material would cost $1.50.

Not even the ladies choose their routes by reason of the outside colors of the cars being canary yellow, wine red or royal blue. If the decoration were reduced to the simple name of the road on the letter boards and four numbers on the sides, this could all be done for about $4 per car, or for 34,200 passenger cars in the United States and Canada this would represent $581,400, and interest at 5 per cent. on this per annum would be $29,070.

The painting, lining, striping and varnishing of passenger trucks will cost $7.40 per car. Two good coats of paint applied without decoration or varnishing cost $2.30 per car.

The inside rubbing down of the varnish to an egg-shell gloss costs for labor $11.40 per car. When done it has shortened the life of the varnish and made it more open and apt to catch and hold dirt, as well as more subject to injury by inside scrubbing. A light rubbing down with ¼ benzine and ¼ raw oil slightly deadens the brush gloss of the new varnish, producing a very fair representation of the egg-shell gloss, and can be done for $1.70 per car. While if the brush finish were left undisturbed, none but trained eyes would notice the differ-

ence, and it is safe to affirm that of those who did notice it not one would change his route on this account.

The writer knows of an instance where a railroad found they were paying $33.50 more per passenger-car for springs of a certain manufacturers' patent design which were supposed to be specially easy riding and very satisfactory, while equally good, durable and easy riding springs were afterward bought on open specification for just this much less.

The statistics of our railroad accidents certainly do not show that good chilled wheels are unsafe, or that steel-tired wheels are any safer for the present average passenger car wheel loads, and there does not seem to be any good reason why railroads should charge their equipment accounts with from $280 to $418 per car for steel tired wheels, and burden their maintenance of car accounts with the cost of tire turnings and renewals.

Turning to our freight cars, one of the first things to challenge question seems to be the pressed steel craze. A certain road buying 2,000 30-ton freight cars yielded to the blandishments of a pressed steel man and equipped the cars with pressed steel center plates. The cars were turned out with ⅝-inch side-bearing clearance; inside of 18 months every one of them had to be changed to malleable iron center plates because the design of center plate was not one suited for making in pressed steel; they crushed under the battering pressure of the loaded car bodies until the side-bearing clearance was all gone, and in less than two months the loads were being carried entirely on the side-bearings, and the pressed steel center plates acted like cold saws and sawed off the center plate bolts. It cost that road $3.76 per car to replace those center plates, which meant for the 2,000 cars an item of $7,520.

The pressed steel trucks were a big improvement over some freight trucks, but that does not necessarily imply that they are better than all archbar trucks, and they certainly are an increased source of expense when renewing wheels; besides, when bent up in a mishap, are practically unrepairable at the ordinary railroad shop, and can only be scrapped, unless the shops are provided with formers and presses to reset them after the parts are cut apart. Now, a good all-steel diamond truck with double 8-inch eye beam blocked bolster, steel spring channel, steel brakebeams with inside-hung brakes, malleable center plate and side bearings, 4¼×8 in. M. C. B. axles and 600-lb. wheels, which cost just as little for running repairs as the pressed steel truck, and cost a great deal less in case of accident repairs, can be built for $74.50 per truck, including all material, all shop labor, uncharged time and supervision. Such being the case, we ought to stop to think several times before increasing the cost of our cars about $70 each for pressed steel trucks; this amount would very nearly pay for an outfit of air-brakes and couplers for the car and help the railroad company to comply with the terms of the Railway Safety Appliance Act.

The same may be said of elaborate designs of trucks having a lot of patented features to provide lateral motion by various mechanical contrivances that make the cars under which they are placed cost about $30 each more than for a good all-steel diamond truck.

It has been a fashion in some parts of the country to stencil the freight cars with 30 to 36-in. letters and figures, as if the conductors and yardmen were in the habit of standing off a quarter of a mile when taking numbers. If those who stencil cars in this way had to run along a train of 35 cars on a dark night between the tracks in the yard, taking initials and numbers, they would very soon resort to the use of small letters and figures grouped close together where the light of a hand lantern would cover them all at once, and so that the eye can at short range take them in at one glance in daylight or dark, instead of having to run up and down all the way along a 34-ft. car to have to read four or five initials and four or five numbers. The large stenciling for about five letters and five figures repeated on both sides of the car costs for white lead and labor, 76 cents. The same number of 6 or 7-in. letters and figure grouped together would cost 34 cents; difference in favor of small stenciling per car, 42 cents. If this could be saved for all the 1,190,000 freight cars in the United States and Canada, it would mean $499,800, the interest on which at five per cent. per annum would be $24,990.

Now, if we assume that freight cars require restenciling once every four or five years, this would represent an annual outlay of $99,960 spent on the fad of large lettering, without counting interest.

The little red caboose behind the train is commonly painted with vermilion or a cheap imitation thereof, because it is to be considered as a danger signal and bright red is the danger color. To be consistent we should paint the front ends of our locomotives a very bright scarlet, and the ends of all passenger, Pullman and freight cars the same color. Our bright red caboose is just as brown as a common freight car after two or three months running, but remains just as dangerous to run into in spite of having lost its brilliancy. The two months that the red imitation vermilion stays at danger color costs us $6.40 per caboose, instead of $1.65 for brown paint, the difference being $5.75 spent on a bright red fad.

In presenting this paper to the club, the writer in conclusion will ask the members to consider that it is the result of hard times and not to think the spirit of it is simply iconoclastic.

English Law and Practice as to Railroad Pooling.

I am asked to sketch the position of railroad pooling in England. Beginning with the law, let me premise that it is both scanty and out of date. For our general railroad statutes make no direct mention of the subject, and it is more than 40 years since the last case, which, as far as I know, raised the question of pooling as matter of principle, came before the coarts. On the authority of that case (Hare v. L. & N. W. R.)—I quote from our recognized text-book, "Browne & Theobald's Law of Railways"—"it seems that two companies having the same termini may, in order to avoid competition, come to an agreement with reference to the traffic along existing routes on their lines, with a view to distribute such traffic and the revenue derived from it between the two companies." To quote another text-book, "Hodges on Railways," "There appears to be no doubt that an agreement is not illegal simply because its object is to exclude competition."

On the other hand, railroad companies are creatures of statute, and lack, as I have said, positive authority to enter into agreements with competitors. Accordingly in the report of the Joint Committee of the two Houses of Parliament in 1872 it is stated that:

"Whether division of traffic receipts on the joint purse principle is valid at law or not is open to considerable doubt. It is clear that the courts will not set aside such an arrangement on the ground that it is illegal in the sense of being contrary to public policy. But the doubt is whether such an arrangement, which is in fact a sort of Parliament, is not *ultra vires* of each company, and whether it may not therefore be set aside at the instance of a shareholder. This doubt, the committee are advised, is such as to make it unsafe for companies to enter into such an agreement without the sanction of Parliament although there is evidence that they sometimes do so."

Such is the position under the general law. But there are several private acts of Parliament under which particular agreements for the exclusion of competition have been clothed with statutory force. Of these one of the best known is the West Midland Amalgamation Act of 1863, which stereotypes a policy of non-competition between our three largest companies, the North Western, the Midland and the Great Western, throughout the whole of Wales and the adjacent counties of England. A second is an act of 1862, which gave statutory authority to an agreement between the South Eastern and the London, Chatham & Dover, under which all traffic passing to or from the Continent through any channel port between Margate and Hastings was to be and is pooled, and the receipts divided between the two companies in certain proportions. I believe I am correct in saying—but as the agreement is not published I cannot speak positively—that the precise proportions of the division were approved by Parliament, and not left to subsequent determination. An act of 1870, which was re-enacted with certain modifications of detail in, I think, 1892, confirms an agreement between the Brighton and the South Eastern companies. This agreement contains the following clause:

"As regards competitive traffic, the companies, shall from time to time agree on the service of the trains and the rates and fares, and neither of them shall run any train or charge any rate or fare except in accordance with the agreement for the time being in force, nor shall either company divert any traffic, or do any other act to the prejudice of the other company or which shall be contrary to the fair and true spirit of this agreement, which is based upon the principle of avoiding unnecessary competition between the companies."

It is, then, clear that in England no attempt has been made to restrain companies from pooling and that in particular cases Parliament has even actively interfered to put a stop to competition. It only remains to say a word as to the extent to which pooling exists in England to-day. On this point there is probably no single person in the country who could speak with more than an approach to accuracy; for each company keeps its arrangements with its neighbors strictly private. Consequently the outside public as a rule know nothing of them, while even railroad officials themselves know only the agreement by which their own companies are affected. But my own distinct impression is that the Joint Committee of 1872 underrated the extent to which pooling prevails. It is, for instance, matter of common knowledge that the vast competitive traffic of the Lancashire & Yorkshire and the North Western in Lancashire is pooled. The same thing is true of the North British and the Caledonian in Scotland. Territorial agreements—agreements, that is, not to promote or to aid and abet new railways in the district of a rival company—are also common. There is, for example, one between the Caledonian and North British, and another between the Great Western and the South Western. Further, it is a general rule, not without, however, important exceptions, that, as against a company which can carry all the way from A to B, a company which can only carry part of the way does not attempt to compete by quoting rates or fares or advertising through services. As for the rule that no company alters rates or fares to competitive points without notice to its rivals, this is so fundamental in English railroad practice that its observance is regarded as a matter of course. If the rival objects to the proposed reduction, nine times out of ten it is abandoned. The tenth time it may be persisted in, but the persistence is almost equivalent to a declaration of war, and we Englishmen are a peace-loving folk. [!!—EDITOR.] Competition by improvement in service still remains open, but even here it is common, though by no means universal, to give notice to a rival, more especially in regard to passenger traffic, of any proposed improvements.

An American reader, unfamiliar with English conditions, will, I doubt not, after reading thus far exclaim: Then competition in England is practically dead!" But he will be wrong. Competition is not dead and shows no signs of dying. In the last few years, for instance, the North Western has wrested from the Great Northern a much larger share of the Edinburgh and from the Midland a much larger share of the Glasgow passenger traffic, while in return the Great Western has successfully challenged the North-Western monopoly in Birmingham. So in goods traffic the Great Eastern has become an important factor in the Yorkshire field. Even where traffic is pooled, as for example between Edinburgh and Glasgow and between London and Portsmouth, the Caledonian and the South Western respectively have gained so much on their partners as to compel a reapportionment of the partnership assets.

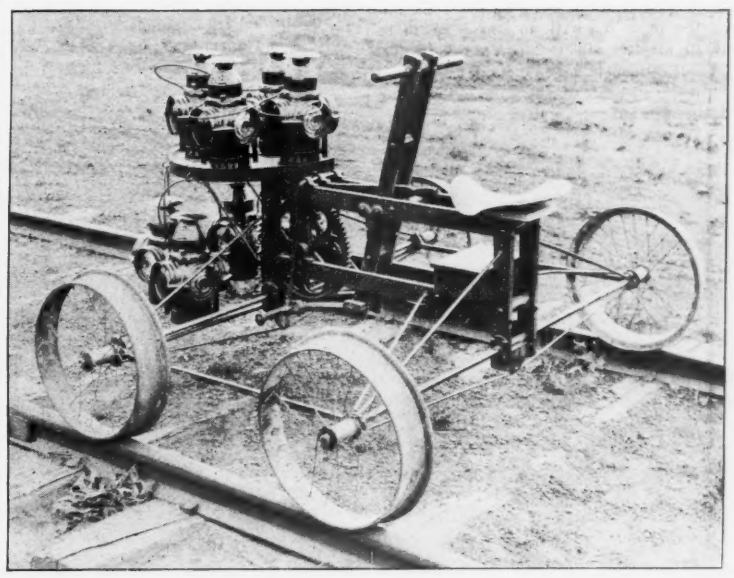
Tot homines, quot sententiæ is as true in railway matters as in other human affairs. But I think among Englishmen who have studied these questions there is a fairly general agreement that in this most difficult of all railroad problems, England has hit the happy mean between the semi-stagnation of the Europeon Continent and the unbridled and suicidal competition of the American railroads.

W. M. ACWORTH.

LONDON, Dec. 1, 1897.

The "Eclipse" Velocipede.

The accompanying engraving shows a railroad velocipede of somewhat novel construction, and made especially to meet a demand for a four-wheel, light, and easy-running machine to carry a number of signal lanterns. The wheel base is but 2 ft 7 in. Either roller or ball-bearings are provided throughout and every part is as light as possible, but the very best material has been used in its construction, so that great strength and lightness have been combined to enable the rider to secure both safety and speed. The weight complete is but 80 lbs. It can be propelled either forward or backward by using both the hands and feet in an easy reciprocal counterbalancing movement. As seen in the illustration, eight lamps can be carried on the "Handy" attachment at one time. An extra seat and levers for carrying two riders will be provided, if desired, at a small additional expense.



New "Eclipse" Velocipede with "Handy" Lamp Attachment.

This velocipede, recently brought out by Roberts, Throp & Co., of Three Rivers, Mich., is sold at a surprisingly low figure, and the entire satisfaction expressed by many users in the short time it has been in service indicate that it will find a place and be well received on many roads.

Foreign Railroad Notes.

The Swiss National Council, Sept. 28, voted in favor of the purchase by the confederation of the five principal Swiss railroads.

So bad was the harvest in Hungary this year that the state railroad authorities have agreed to ship seed wheat to farmers who have not enough for seed, at 40 per cent. of the regular rates.

The extended effect of competition on transportation is shown by a proposition in the Austrian Parliament to reduce freight rates on fruit on account of the competition of American fruit.

The exports of petroleum from Russia in 1896 were 282 millions of gallons, estimating five gallons to the Russian pood of 36 lbs. Six-sevenths of this was illuminating oil. Germany received 25,850,000 gals.

Passenger trains run slowly in Russia, but it is proposed to go faster, and last summer trials were made on the line between St. Petersburg and Moscow at a speed of 49 miles an hour, and it was concluded that such a speed is practicable for a regular express.

They take time by the forelock over the water. The European Time Convention, which is to agree upon through time tables for next summer, was held in Frankfort-on-the-Main Dec. 8 and 9. About 150 railroad and steamer companies or administrations were represented.

The Swiss railroad jubilee was celebrated on the 9th of August last, the first Swiss railroad, from Zurich to

Baden, 14 miles, having been opened for traffic Aug. 9, 1847, which seems a very late beginning. About a mile of railroad on Swiss territory, on the line from Strasburg to Basel, had been open since 1844, but this was built and worked by a French company.

The first Siamese railroad, a government line, was opened with great ceremony March 26 last from Bankok, the capital, to Ayuthia, about 43 miles, having been five years under construction. It is intended to be the main stem of a Siamese railroad system. A German engineer had charge of the work on the part of the government and the contractors were English, and it is intimated that the long time required for completing the work was to some extent due to differences between them.

The Austrian Railroad Ministry has recently offered prizes for plans for simplifying or cheapening methods of doing business in the commercial service, including new methods and the improvement and perfection of old ones, in the transportation, claims and rates departments. Definite plans are called for, but they need not be finished essays. It is proposed to offer 12 prizes, varying from $24 to $240.

A number of trains on the Berlin City Railroad (elevated) have been equipped with apparatus for burning acetylene gas, which is expected to give a better light and at the same time cost less than the gas now used. If the experiment with these trains proves satisfactory all the city and suburban trains will be lighted with acetylene, probably within the year 1898.

There is talk of a new Alpine railroad which, if executed, would give its passengers something like the sensations of a man in a balloon or a bird in the air. The plan is to stretch six strong cables from the present upper terminus of the Pilatus Railroad high through the air to the summit of the Klimsenhorn, another peak of Pilatus about half a mile further west and 525 ft. lower. On these cables would be suspended a car running on trolleys and hauled from one peak to the other by a wire rope. The car at some parts of its course would be perhaps a thousand feet above the surface, and the views, doubtless would be varied and magnificent. Whether there is any more at the bottom of the plan than the imagination of a newspaper man does not appear.

TECHNICAL.

Manufacturing and Business.

The Pennsylvania Railroad is receiving bids for an extension of Piers 16 and 17, South Wharves, Philadelphia, Pa.

The McCord journal box and lid, made by McCord & Co., Old Colony Building, Chicago, has been specified on the 500 cars for the Columbus, Hocking Valley & Toledo.

The Brooklyn & New York Railway Supply Co., makers of bronze car trimmings and railroad supplies, Elizabeth, N. J., is about finishing rebuilding the portion of the plant devoted to car building and destroyed by fire last April. Work will probably be resumed within a month or two.

We published last week a description of the 17 ft. gap 100-ton triple power hydraulic riveter, furnished by R. D. Wood & Co., of Philadelphia, for the Schenectady Locomotive Works. Within the last few days this concern has taken an order for a similar riveter, namely, 100 tons and 17-ft. gap, from Neilson & Co., locomotive builders, of Glasgow, Scotland; also a similar riveter, with 12-ft. gap, for the Brooks Locomotive Works. Wood & Co. have also lately taken an order from the Baldwin Locomotive Works for two portable hydraulic riveters, one of 15 tons and the other of 30 tons capacity.

Proposals for furnishing Chicago with materials for the extension of the municipal lighting plant were advertised for by the City Comptroller on Dec. 10. The machinery and electric light equipment, on which bids were asked, will be installed at the Hyde Park and Lake View pumping stations and will be used for additional street lights in these districts. The specifications call for one Corliss compound engine, two high-speed cross-compound engines, 10 150-light arc dynamos, 1,100 2,000-candle-power arc lamps and 246 miles of weatherproof line wire. Bids will be opened and contracts awarded on Dec. 22.

The Litchfield Car Works, of Litchfield, Ill., has been incorporated under the laws of Illinois with a capital stock of $20,000. The incorporators are: D. W. Taylor, F. R. Milnor, C. F. Bartling, J. H. Burtner, David Davis, Jr., and J. C. Sinclair.

At the annual meeting of the Bloomsburg Car Co., of Bloomsburg, Pa., the following officers were elected: President, E. B. Tustin, vice L. S. Wintersteen, resigned; Vice-President, J. K. Lockard; Secretary, R. W. Oswald and Treasurer, R. R. Angell.

Harry W. Frost has been appointed General Sales Agent of the Monarch Brake Beam Co., of Detroit, with headquarters at Chicago.

The Chicago rabbetted grain doors and Security lock brackets have been specified on 1,000 cars being built by the Haskell & Barker Car Co. for the Illinois Central; on 250 being built by the St. Charles Car Co. for the Illinois Central, and on 250 for the Chicago & West Michigan being built by the Michigan Peninsular Car Co.

The American Steel Foundry Co. is building 12 American railroad ditchers, to be 60 ft., long and of 120,000 lbs. capacity. These are to be used for ditching on either side of railroad tracks.

Mr. M. E. Davis has been appointed Assistant to the President of the C. L. Pullman Car Co., the appointment taking effect on Monday, Dec. 13, 1897.

The firm of Samuel Hermanos, of New York and Mexico, has closed a contract with the government of Mexico for supplying all the material required by the Public Works Department of that country. This will include the railroad, lighthouse, telegraph and post office materials.

Iron and Steel.

The blast furnaces of the Watts Steel & Iron Syndicate, Ltd., of Middlesborough, Ky., were blown in on the night of Dec. 9 and the steel works and rolling mill will soon be started up. This plant has been idle for a number of years and now starts up with new working capital under the management of Mr. C. P. Perin.

Thomas' Pneumatic Interlocking.

The pneumatic interlocking apparatus for switches and signals which was installed on the Nashville, Chattanooga & St. Louis last year, and which has been extended, until now there are six towers, was described in the *Railroad Gazette* of June 17, 1896. Some additional facts, with a statement of train movements, were given in a letter from Mr. J. W. Thomas, Jr., the designer of the apparatus, in our issue of July 16, 1897. We now give in the table below a statement of the number of trains run over the two miles of road equipped with pneumatic block signals in the six months of the Tennessee Centennial Exhibition, during which time the movement over this part of the road, which connects the Nashville Union station with the Centennial grounds, was very heavy.

	No. of Trains.		Av. per week day.	
1897.	Cedar St. and Clinton St. (Single track.)	Clinton St. and Centennial Grounds. (Double track.)	Single track, ½ mile.	Double track, 1½ miles.
May	7,136	6,639	253 3	230.3
June	7,350	6,892	266.5	247.2
July	7,431	7,357	259.7	255.5
August	7,357	6,942	260.5	247.5
September	7,306	6,839	262 5	243.5
October	7,599	7,106	269.4	253.4
Total	44,179	41,775	.....	.....
Average	7,363	6,962	262	246.2

The highest number of trains moved in any single day over the single track section was 314, and over the double track 306. Although this apparatus was entirely new, and designed on a new plan, it worked with remarkable success. The trains were handled without accident and the greatest delay was six minutes. The figures above given cover all train movements, including, of course, those of freight and yard trains. Regular passenger trains were run to and from the Centennial grounds every half hour, and extra trains when needed. The number of passengers carried between the Union station and the Centennial grounds was 481,525, none of whom received the slightest injury.

THE SCRAP HEAP.

Notes.

The State Railroad Commissioners of New York will give a hearing Dec. 21 on the question of postponing the date on which the railroads must comply with the state automatic car coupler law.

Superintendent Dice, of the Shamokin Division of the Philadelphia & Reading, has issued an order that firemen must have run six months over the whole length of the division before being eligible to promotion to be engineers.

At the annual meeting of the Atchison, Topeka & Santa Fe, at Topeka, Dec. 8, the eleven directors of the company present gave to the Railroad Young Men's Christian Association of Topeka $550, being the sum of their fees for attending that meeting.

Train No. 20 of the Southern Pacific was attacked by five robbers near Willcox, Ariz., on the night of Dec. 9, but armed guards in the express cars at once fired upon the assailants and killed the leader and wounded another one. When the survivors saw that their leader was dead they fled.

The directors of the Merchants' Association of New York, the body which recently secured reduced fares for out-of-town buyers, have passed a resolution favoring the anti-scalping bill now before Congress and directing the officers and counsel of the association to cooperate in furthering the passage of the bill.

The Railroad Commissioners of New York intend to ask the Legislature to appropriate $250,000 for use in paying the state's share of the cost of abolishing highway grade crossings. The law passed a year ago authorizes the expenditure by the state of only $100,000 annually, but the Commissioners have already received 50 applications for the abolition of crossings.

The Denver & Rio Grande has brought suit in the United States Circuit Court at Denver against the Colorado Midland for $50,000 damages sustained in the New Castle wreck of Sept. 10, when a westbound Rio Grande express collided with an eastbound Midland freight, resulting in the complete destruction of both trains and the death of 13 passengers. The coroner's jury fixed the responsibility on the crew of the Midland train, which was running ahead of time.

It is said that large sums of coin are now sent through the mails in registered packages, one million dollars having been recently sent from San Francisco to New York put up in packages of $1,000 weighing four pounds each. The Bankers' Mutual Casualty Company, of Des Moines, Ia., insures such shipments, and in a report printed in a Chicago paper it is claimed that the company has 1,300 customers. A number of marine insurance companies are said to be also engaged in the same business.

Representative Sperry, of Connecticut, has introduced in Congress a bill to consolidate the Post Office Department with the Interstate Commerce Commission, and to require the enlarged Department to secure control of the railroads and do all the passenger and freight business of the country. The bill is introduced "by request," evidently the request of Mr. Cowles, the Connecticut theorist; and all the newspapers of the country, where the desk of the telegraph editor is run by machinery, have published the news with a sober and dignified headline.

A few weeks ago (*Railroad Gazette* Nov. 12, page 803) the Southern Pacific, the Southern California and the Santa Fe Pacific announced that subordinate employees of other roads must pay fare over those roads, at one-half the regular rates. It is now announced that in lieu of this half-rate tariff a uniform special rate of $15 through to and from California points will be made for such railroad employees. From Ogden to San Francisco the distance is 895 miles; from El Paso to San Francisco it is 1,294 miles. From this it will be seen that the rate per mile varies from 1.16 cents to 1.66 cents.

The "Blacklisted Association of America" is the name of an organization of "railroad men" formed in Chicago last week to raise money to sue railroads for being blacklisted. The President of the Association is W. A. Marrow. According to the reports in the Chicago papers this association has been formed in the hope of securing a large number of verdicts against the railroads like that for $21,000 recently secured by F. R. Ketcham against the Chicago & Northwestern. It is claimed that Ketcham's case was very weak as compared with many others which are soon to be sprung upon the astonished railroads.

The Illinois Central lately began dumping gravel into Lake Michigan near Twenty-fifth street, Chicago, with the intention of making land on which to build an engine house, but the city sent policemen to stop the work. The matter was carried to the Superior Court and Judge Freeman, in that court, has now decided that both the railroad and the city were wrong. The company may build out into the water any wharves or structures necessary to facilitate communication to or from vessels, but nothing for any other purpose. The present offense is against the State, not the city. The charter of the railroad empowers it to enter upon and take possession of "lands, streams," etc., within a width of 200 ft. along its right of way, but lakes are not specified, and the Court holds that the State has not authorized the erection of any structure by the railroad on the lake.

Interstate Commerce Commission.

Hon. Edward M. Paxson, formerly Chief Justice of the Pennsylvania Supreme Court, and lately one of the receivers of the Philadelphia & Reading, is mentioned by the Washington corrospondents as a candidate for the vacancy on the Interstate Commerce Commission, which will be occasioned by the expiration of the term of Mr. Morrison next month; but it is reported that Western Senators advise against the appointment of an Eastern Republican, as the Commission would then be divided geographically in an undesirable way. The three Republicans would be from the Northeast, and the South and West would be represented by the two Democrats. This, it is said, would make it very difficult for Republican Senators from Illinois, Minnesota or Iowa to vote for a pooling bill. The United Labor League of Philadelphia has protested against the appointment of Mr. Paxson, on the ground that he is not a friend of "labor."

The Railway Conductors' Club.

The Railway Conductors' Club of North America, some account of which was given in the *Railroad Gazette* of May 14 last, has been investigated by the Charity Organization Society, of New York City, and its character seems to be about the same as it was eight months ago, but the large and comfortable club house at 115 East Thirty-fourth street, New York City, appears to have been given up. The Charity Organization Society got a list of the 617 honorary members and wrote to every one of them. To these inquiries 410 replies were received; 47 of the writers were positive that they never had heard of the club; 86 have been asked to contribute and have done so; 70 have been asked, but have not contributed. Not one of the 410 knew a single thing about the government of the club nor of the manner in which its alleged objects were being carried out. Recently an assessment of $5 has been made by the Board of Governors on all honorary members "for the year 1897," all money thus raised "to be used for the purposes of building and maintenance." The Charity Organization Society has printed a list of prominent railroad officers and others who are claimed to have given endorsements of the club and to have accepted honorary membership. The "club" is now located in rooms over the Chimney Corner saloon, at Twenty-fifth street and Sixth avenue, New York.

Lumber for Car Shops.

The most notable feature in connection with the yellow pine trade is the continued large requirement for car material. All through the season car builders have been making heavy demands, but there is no diminution as yet; and, in fact, the requirement promises to continue through the winter in unabated volume. The demand is not only from independent car shops, but from those which are owned by railroad companies; and is not only for car material but for construction purposes.

Car shops are, almost without exception, filled up with orders, and are scouring the yellow pine country for sills, plates, siding, roofing, linings, etc. The Peninsular Car Company, of Detroit, Mich., is turning out its full capacity of 100 cars a day. The price of siding

has advanced $4 or $5 within the last six months. Prices on sills and plates are higher than they were.

The demand for yellow pine is increased by the adoption of this wood by some railroads which have not hitherto used it extensively. It is stated that the New York Central has requisitions out for 85,000 heart, yellow pine ties. The Pennsylvania Company is also going back to yellow pine, after having abandoned it for some time, and has recently placed orders in Georgia for 1,000,000 ft. of car stock. Texas is a large buyer of railway material, chiefly ties, and altogether there is an amount of this kind of business which makes it a feature of the season.—*The Timberman.*

Massachusetts Institute of Technology.

Field work for the first term in Railroad Engineering is now completed. This very important branch of study for the civil engineer is preceded by a year of study and field work in general surveying, so that the men come well prepared to apply their knowledge to railroad work. Railroad work at the Institute is taken up in the same order and in substantially the same fashion as in practice, viz , reconnoisance or general examination, preliminary survey with instruments and then with location. It has been possible, each year for the past 10 years, to carry on the work over ground that is fairly well adapted to the purposes of a railroad, although the survey when completed has sometimes shown difficulties, so that the route projected did not seem advisable. In several cases, however, reasonable lines have been secured. This work in railroad surveying is supplemented in the field work of the second term by a thorough drill in the details of laying out curve work, including transition curves, and in the setting of slope stakes, which cannot be suitably taught except in the field.

Woodiline for Signal Poles and Ties.

The American Wood Preserving Co., of Philadelphia, makers of woodiline, have recently sent a quantity of their preservative to the New York Central for use on signal poles and boxing. Orders from a single large Eastern road aggregate 4,000 gallons during the past two months. The Cumberland Valley Railroad used the material on its Harrisburg bridge during October and ties treated with woodiline are now being put in on the elevated approach to the Broad street station, Philadelphia, and in Jersey City. It is of interest to note that in addition to the 14 year tests of woodiline on black oak, there are 102 black and white oak ties down five years on the Amboy Division, near Beverly, which are in excellent condition, showing no decay, although the average life of black oak in this location is about four years.

Lehigh University.

Winter L. Wilson, Engineer of the Guatemala government on the Guatemala and Mexico boundary survey, has been appointed Instructor in Civil Engineering in Lehigh University, to fill the vacancy caused by the resignation of John P. Brooks, who recently accepted a professorship in the State College of Kentucky. Mr. Wilson was graduated from Lehigh in 1888 with the degree of Civil Engineer, and until 1891 was engaged on the Pennsylvania Railroad in the construction and maintenance of way departments. He then studied law, and was admitted to the Maryland bar. From 1892 to 1895 he was on the field and office work of the Intercontinental railroad, and since 1895 has been on the geodetic survey of the boundary line between Mexico and Guatemala. Mr. Wilson will enter on his duties at the beginning of the second term in February, taking charge of the instruction in topographic, geodetic and railroad surveying.

The Life of Locomotives.

The life of locomotives is not as long as is usually believed. Recent comprehensive investigations in England have shown, on the contrary, that locomotives last for only about 500,000 miles on an average. In other words, a modern locomotive, after a run of this length, is so used up that further repairs do not pay. Of course, during the locomotive's life, various parts have to be repaired or renewed repeatedly. The fire-boxes, for instance, must be renewed three times, the tires five or six times, and the driving axles three to five times.—*Dingler's Journal.*

A Russian Car Works.

A new stock company has been formed in Russia for building railroad cars of all kinds, passenger as well as freight. The capital stock of this company is 10 million roubles, divided into 80,000 shares, and the organizers are P. N. Ushakow, a Moscow merchant: Kuldschinsky, an engineer; the German subjects Hermann Dernen, Georg Woldemar Müller and A. J. Rothstein, an engineer, and the French citizen Theophil Lombardo.

Japan's Foreign Trade.

The foreign trade of Japan for the first half of the present year has been in excess of that of any previous year, the exports having amounted to $37,535,743 and the imports to $49,520,612, making a total of $87,056,355. The exports to the United States in the first half of the past year were $6,141,917 and the imports $3,724,597, making a total of $9,866,514, whereas during the first half of the present year the exports to the United States have reached the large sum of $11,016,985 and the imports $6,500,986, making a grand total of $17,517,971, an amount which has never been exceeded either in imports or exports. Following are some details of the imports of railroad material into Japan for the first six months of the year and for the corresponding period of the year 1896. The total imports of railroad material, machinery, etc., were valued at $6,018,752 in 1897; in 1896, $2,439,946. This was an increase of $3,578,806; that is, the imports were more than doubled. Locomotives and railroad cars were imported to the value of $1,017,522 in 1897; in 1896, $275,577. Machinery, 1897, $3 306,156; 1896, $1,490,880. Railroad material, 1897, $436,879; 1896, $146,791. Rails, 1897, $874,040; 1896, $399,454. Boilers, engines, etc., 1897, $384,155; 1896, $129,244. A great part of these imports has come from the United States.—*Consular Reports.*

The Indianapolis Three-Cent Fare Case.

The United States Circuit Court of Appeals has rendered a decision dismissing the appeal in the case involving the constitutionality of the 3-cent street car fare law passed by the last Legislature. The case was one in which the Central Trust Co., of New York, in a bill filed in the Federal Court at Indianapolis, asked for an injunction restraining the enforcement of the three-cent fare act passed by the Legislature of Indiana last March. The trust company is the mortgagee for a three-million dollar bond issue of the Indianapolis street car lines. The court holds that as the Indianapolis Street Car Co. was formed under the general laws in Indiana, amendment providing for a three-cent fare can be effected only by a general law applicable alike to all similar corporations throughout the state. It is probable that the case will be revived again and City Attorney Kerns, of Indianapolis, states that the decision is not a victory for anybody, so far as the merits of the case are concerned. The matter will probably be brought up in the United States Supreme Court in two or three months.

Cooperage Charges not Stated.

At a recent trucking match between picked crews from rival freight houses in St. Louis, the crew of the Mobile & Ohio came off victors, having transferred 100 bbls. of flour from one side of a hall to the other side, 120 ft., in 12 minutes. The other contestants were crews from the Illinois Central and the Big Four. The winners wish us to announce that they claim to be able, when fully limbered up, to perform the feat in 10 minutes or less. In each crew there were three truckmen, a breakout and a storeman.

"Original Package" Freight.

A press dispatch from Chattanooga says that Judge Clark, in the Federal Court at that city, has decided that cigarettes in original packages may lawfully be transported from another state into Tennessee, and that boxes of 10 cigarettes each, shipped loose in baskets are in original packages, and can be sold singly notwithstanding the Tennessee law. In South Carolina whisky is shipped in pint bottles (and even *half pints*) packed, with excelsior, in little boxes about half as large as a cigar box. If, now, the Tennessee and the South Carolina traffic could only be combined, the brakemen on the local freight trains down that way ought to enjoy life. But the life of the freight checkers must be a burden to them. We suggest that they strike for the privilege of having shipments of over 1,000 packages each billed as "a lot."

Improvement of Chicago River.

At a meeting of the Special Committee mentioned in our issue of last week, on the Improvement of the Chicago River, held in Chicago, Dec. 4, Mayor Harrison, Capt. J. S. Dunham and Mr. M. B. Madden were named as a committee to draw up a memorial to Congress asking for an appropriation. The minimum depth asked for will be 21 ft. It was also decided that whatever work Chicago does in the river, such as changing docks and lowering tunnels, should be done with a view to an ultimate depth of 26 ft. As the standard depth of harbor established by the government is 21 ft., it was not thought that Congress would provide for a greater depth at Chicago.

The Kingston Railroad Decision.

The Court of Appeals at Albany has denied the motion for reargument in the Kingston railroad case, the decision in which was handed down several weeks ago, and while the case itself applies only to the city of Kingston, where one street railroad sought to use the tracks of another on a street where it was necessary for both to operate to have continuous lines, the decision was general in character and is held to apply to all other lines in the state. It has been thought that the opinion might interfere with the operation of those surface roads in New York and Brooklyn, where one street railroad used a portion of the tracks of another road without the consent of the local authorities and the adjacent property owners. Especially in the latter place some of the street railroads have been arranging to use the tracks of other roads without such consents.

Mr. H. H. Vreeland, President of the Metropolitan Street Railway Co., New York, commenting upon the Court's decision, says:

"The decision in the Kingston case has not the least bearing upon our company. The issue presented to the courts in this case was whether a railroad company wishing to operate its cars over the lines of another company could do so without a special franchise and without obtaining the consent of the adjoining property-owners, although it had the permission of the company owning the tracks. The courts decided, and this is the point of the whole matter, that two companies could not take advantage of one franchise, and that a thoroughfare for the use of which only one franchise existed could not be further burdened, unless the authorities and the property-owners were willing to have two operating systems on one street. It was held in the matter of the Kingston controversy that the company owning the lines had no legal right to give permission to another company to use them jointly."

LOCOMOTIVE BUILDING.

The St. Louis, Peoria & Northern is in the market for two passenger engines.

The Pennsylvania Railroad will build 15 consolidation locomotives for its Western lines at the Altoona shops.

The Baldwin Locomotive Works are building for the Wabash Railroad one Atlantic type passenger locomotive.

The Boston & Maine has placed an order with the Schenectady Locomotive Works for eight Mogul locomotives.

The Baldwin Locomotive Works have received an order from the St. Louis, Peoria & Northern for two eight-wheel passenger locomotives to have 18 × 24 in. cylinders.

The Kanawha & Michigan has placed an order with the Baldwin Locomotive Works for three mogul locomotives to be built in 30 days. They will have 17½ in. by 24 in. cylinders.

The Baldwin Locomotive Works have received an order from the Baltimore & Ohio for 10 consolidation simple locomotives. They will have cylinders 21 in. × 26 in., and will weigh 150,000 lbs. each.

The Peoria & Pekin Union Railway has bought two switching locomotives from the Rhode Island Locomotive Works. These engines are to have cylinders 18 in. × 24 in., weight 105,000 lbs. and are to be delivered in January, 1898.

The Wabash has ordered from Albert Waycott & Co., Western Agents for the Richmond Locomotive & Machine Works, five freight locomotives. The Pittsburgh Locomotive Works and Baldwin Locomotive Works have received similar orders.

The Baldwin Locomotive Works are building for the Norfolk & Western six two-cylinder compound consolidation locomotives. The cylinders are to be 23 and 35 in. diameter by 32-in. stroke; weight, 175,000 lbs.; weight on drivers, 155,000 lbs.

The three eight-wheel passenger locomotives recently ordered from the Baldwin Locomotive Works by the Southern Indiana will have cylinders 15 × 24 in., drivers 56 in. diameter, extension wagon-top boilers, and a total weight of 80,000 lbs., with 50,000 lbs. on the drivers.

In our last issue in describing the Brooks consolidation locomotive for the Mexican Central we said that the axles and the staybolt and piston rod iron were furnished by the Taylor Iron & Steel Co. This material was furnished by B. M. Jones & Co., sole representatives in the United States of Samuel Osborne & Co., of Sheffield, and Taylor Bros. & Co., of Leeds.

CAR BUILDING.

The Kansas & Texas Coal Co. has ordered 50 coal cars from the St. Charles Car Co.

The Pennsylvania Railroad will build 500 freight cars for Eastern lines at the Altoona shops.

The Vandalia line has placed an order with the Missouri Car & Foundry Co. for 100 freight cars.

The St. Charles Car Co., of St. Charles, Mo., is building 50 freight cars for the Los Angeles Terminal.

The Allison Mfg. Co., of Philadelphia, Pa., is building 350 freight cars for the Central Railroad of Brazil.

The Youngstown Car Mfg. Co., of Youngstown, O., is building 25 freight cars for the Pittsburgh & Western.

The Lima Locomotive & Machine Works, of Lima, O., are building six freight cars for the Manhattan Oil Co.

The Haskell & Barker Car Co., of Michigan City, Ind., is building 10 freight cars for the Chicago & Eastern Illinois.

The Green Bay & Western Railroad has received 150 new box cars from the Haskell & Barker Car Co., of Michigan City, Ind.

The North Pacific Coast Railroad has placed an order with Pullman's Palace Car Co. for three new passenger cars for delivery by April 1, 1898.

Last week one of our contemporaries reported that the Kansas City, Pittsburgh & Gulf had ordered a new style chair car, designed with a separate apartment for ladies and children. This report is incorrect.

The Michigan Peninsular Car Co. is building 150 cars for the Chicago & West Michigan. The cars will have Chicago rabbetted grain doors and Security lock brackets. This is in addition to the 100 mentioned in our issue of Nov. 19.

In our issue of Nov. 19 we noted that the Iowa Central was in the market for 150 box cars. The order for these has been placed with the Terre Haute Car & Mfg. Co., of Terre Haute, Ind. The cars will be 34 ft. long, of 60,000 lbs. capacity, and will have McCard journal boxes, New York air brakes, Trojan couplers, Chas. Scott Spring Co.'s springs and Chicago and Cleveland roofs.

The Gulf & Ship Island is receiving 100 new flat and two new passenger cars from the Ohio Falls Car Mfg. Co. They are equipped with New York air brakes and Tower couplers. The road has bought altogether this year 200 flat cars of 60,000 lbs. capacity and 40 ft. long, and one complete passenger train consisting of two coaches and a combination baggage, mail and smoking car.

The recent orders of the St. Louis & San Francisco included 100 ventilated fruit cars and 100 coal cars from the Charles Car Co., and 100 coal cars and 100 furniture cars from the Missouri Car & Foundry Co., all of 60,000 lbs. capacity. American Steel Foundry Co.'s steel trucks, Trojan couplers, Marden brakebeams, Westinghouse air-brakes and Winslow roofs will be used on the box cars.

The Southern Indiana has placed orders with the Barney & Smith Car Mfg. Co. for three passenger coaches, three combination mail, baggage and express cars, 25 box cars, 50 coal cars, three standard cabooses and 150 flat cars. The flat, box and coal cars are all to be 60,000 lbs. capacity. The cars will be equipped with Westinghouse air-brakes, Hein automatic couplers, and wooden trussed brakebeams, channeled iron spring planks and diamond frame trucks will be used for the freight equipment.

The Rodger Ballast Car Co. is building for the Chicago Great Western 100 standard ballast hopper cars and four distributing or plow cars, to be 34 ft. long, of 60,000 lbs. capacity and to carry 20 cu. yds. of ballast. Some of the special equipment is Westinghouse air-brakes, vertical plane couplers, Tracy Lyon draft rigging, Kewanee brakebeams and Wells & French 12-in. truck bolsters. The distributing cars will be of the same general standard as the hopper cars and they will have double plows so as to unload either side. They are to be delivered by April 13.

The Wichita Railway, Light & Power Co. of Wichita, Kan., has placed an order with the St. Louis Car Co. for 12 closed and 15 open cars, to be 27 ft. over all. They will be equipped with Walker motors and controllers, St. Louis Car Co.'s No. 8 steel trucks and electric heaters.

BRIDGE BUILDING.

Ashtabula, O.—The new steel swing bridge which is under construction at Ashtabula harbor, for the Lake Shore & Michigan Southern, will cost $130,000 and will be 360 ft. long.

Beardstown, Ill.—The Beardstown Bridge Company has recently obtained a charter and will build a toll bridge across the Illinois River; capital stock, $35,000; incorporators, John F. Duvall, James P. Harris, William Huppert and J. Edward Garm.

Bloomsburgh, Pa.—The Grand Jury has confirmed absolutely the report of the viewers for a county bridge in Mifflin (Columbia Co.) over Smith's Run.

Champaign, Ill.—The Mayor has perfected a plan for abolishing three grade crossings of streets over the Illinois Central, whose tracks run through the middle of the town. It is estimated that the three subways needed can be built for $15,000, including the necessary paving of streets, and it is reported that the railroad company is willing to furnish the superstructures of the bridges.

Conneaut, Pa.—A bridge will be built over a crossing point in this township (Crawford County), by the new Pittsburgh, Bessemer & Lake Erie Railroad.

Detroit, Mich.—The Board of Supervisors have granted the Detroit & Lima Northern the right to build a bridge with a span of 120 ft. across Rouge River, in Springwell township.

Harrisburg, Pa.—Bids for the construction of the new steel state bridge 140-ft. span over the Juniata River at Birmingham were opened Dec. 14, and were as follows: Superstructure—New Columbus Bridge Co., Columbus, O., $6,800; New Jersey Steel & Iron Co.,

Trenton, $6,500; Massillon (O.) Bridge Co., $6,485; Berlin Iron Bridge Co., New Berlin, Conn., $6,300; Variety Iron Works, Cleveland, O., $6,287; Horseheads (N. Y.) Bridge Co., $6,143; King Iron Bridge Co., Cleveland, O., $5,900; Wrought Iron Bridge Co., Canton, O., $5,970; Pittsburg Bridge Co., $5,840; Penn Bridge Co., Beaver Falls, $5,740. Substructure—Pittsburg Bridge Co., $5,000; Penn Bridge Co., Beaver Falls, $4,890; W. G. Stall & Sons, Altoona, Pa., $3,998; H. Stebbin, Wellsboro, Pa., $3,760.

John Patterson, 416 and 420 Walnut street, Philadelphia, is making plans for a steel and iron bridge to be erected up the state for county commissioners

London, O.—Bids are called Jan. 4 for building three bridges in this township. Bridge over Deer Creek at West Jefferson pike; over Deer Creek on Green Lane road; over Point Creek on Linson pike.

Loraine, O.—The Loraine County Commissioners will submit to vote the question of building a high level bridge across Black River. Such a bridge would call for a draw 300 ft., with 700 ft. approach.

Milwaukee, Wis.—It is reported that a new bridge will be erected at Grand avenue, to cost $45,000. City Engineer G. H. Benzenberg might be addressed.

Mount Morris, Y. Y.—George L. Carr, Highway Commissioner, is reported to have let the contract for an iron bridge to span the Bergen Gully to the Owego Bridge Co.

New York, N. Y.—The Board of Directors of the New York & New Jersey Bridge Company have been authorized to consolidate with the New Jersey Company. This consolidation will bring the two companies under the one board of managers. The following directors have been elected: Daniel N. Lockwood, Buffalo, N. Y.; Louis Windmuller, George Young, Charles A. Smylie, William H. Ely, William Bell, T. H. Bauchee, New York; John C. Adams, Newburg; Lorenzo Duncan, John Loughran, Charles H. Swan, Brooklyn; John S. Runnells, Chicago; Gen. Jas. S. Clarkson, Philadelphia.

The last caisson of the new East River Bridge was launched from the foot of South Sixth Street, Brooklyn, at high-tide (1 o'clock p. m.), on Wednesday, Dec. 15.

The Board of Estimate and Apportionment has taken favorable action on the matter of building a viaduct over the Harlem Railroad tracks at 153d street to cost $150,000. The viaduct will be 520 ft. long by 50 ft. wide.

The above Board has also made an appropriation of $50,000 for a bridge over the Bronx at 177th street.

Oakland, Cal.—Plans are wanted until Jan. 10 for an iron bridge crossing the estuary of San Antonio, on the extension of Webster avenue. Frank C. Jordan, Clerk Board of County Supervisors.

Philadelphia, Pa.—An appropriation bill is before the Council, $60,000, for a new bridge across Wissahickon Creek at West Walnut lane, to connect the 21st and 22d wards.

Plattsburg, N. Y.—Two iron bridges will be built by the Town Board, one 42 ft. long, the other 33 ft. long. Both bridges will have a width of 18 ft.

Port Huron, Mich.—On Dec. 6 City Engineer F. F. Rogers received the following bids for building the steel bridge across Black River at Elmwood street: Variety Iron Works, Cleveland, O., $3,452; Iron Substructural Co., Columbus, O., $3,447; King Bridge Co., Cleveland, O., $3,398; Youngstown (O.) Bridge Co, $3,390; Wrought Iron Bridge Co., Canton, O., $3,295; New Columbus Bridge Co., Columbus, O., $3,125; Horseheads Bridge Co., Horseheads, N. Y., $3,100; Massillon (O.) Bridge Co., $2,980; Toledo (O.) Bridge Co., $2,960.

Rochester, N. Y.—City Engineer Fisher has approved the plans by C. W. Buckholz, Chief Engineer, of the Erie Railroad, for a new bridge across the tracks at Clarissa street. it will be commenced in the spring.

Press reports state that Chambers & Casey, of Rochester, have been awarded the contract for building the new canal bridge at Exchange street; contract price, $35,196.25.

Three other canal bridges will be built here this winter for which the Legislature has made appropriation. Fitzhugh street, $20,000; Monroe avenue, $32,000; South Clinton street, $20,000.

Sherbrooke, Que.—A by-law was carried by the ratepayers authorizing the expenditure of $15,000 for a new steel bridge over the St. Francis River.

Syracuse, N. Y.—The council has passed a resolution requesting the local representatives in the Legislature to secure the passage of a bill authorizing the city to build a lift bridge over the Erie Canal at Bridge street.

The board of managers of the Chamber of Commerce have started an investigation of the Rome, Watertown & Ogdensburg's franchise with a view to determining whether or not the railroad can be brought to build a bridge over the Erie canal at Franklin street.

Vancouver, B. C.—The city will build an overhead bridge crossing the Canadian Pacific tracks at the foot of Gore avenue.

Washington, D. C.—The three engineers asked by the District Commissioners to submit designs for a bridge on Connecticut avenue, over Rock Creek, are William H. Breithaupt, 35 Nassau street, New York; L. L. Buck, 84 Broadway, Brooklyn, and George S. Morison, 1742 Monadnock Building, Chicago. The Commissioners will recommend the engagement of the successful designer as consulting engineer.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Eastern Illinois, quarterly, preferred, 1½ per cent., payable Jan. 3.

Chicago & Northwestern, preferred, 1¾ per cent.; common, 2½ per cent., payable Jan. 7.

Denver & Rio Grande, semi-annual, preferred, 1 per cent., payable Jan. 15.

Kansas City Suburban Belt, 1½ per cent., payable Jan. 1.

Minneapolis & St. Louis, semi-annual, first preferred, 2½ per cent.; second preferred 1½ per cent, payable Jan. 15.

Mount Washington, annual, 4 per cent., payable Dec 15.

Manhattan Railway, quarterly, 1 per cent., payable Jan. 3.

New York Central & Hudson River, on capital stock of New York & Harlem, 4 per cent., payable Jan. 5.

Northern Central, semi-annual, 4 per cent., payable Jan. 15.

Northern Pacific, quarterly, preferred, 1 per cent., payable Jan. 15.

Old Colony, quarterly, 1¾ per cent., payable Jan. 1.

Oregon Railroad & Navigation, quarterly, preferred, 1 per cent., payable Jan. 3.

Philadelphia, Wilmington & Baltimore, 4 per cent., payable Jan. 3.

St. Louis & San Francisco, first preferred, 2 per cent., payable Jan. 2.

United Traction & Electric (Providence, R. I.), ¾ per cent., payable Jan. 3.

Stockholders' Meetings.

Meetings of the stockholders of railway companies will be held as follows:

Western New York & Pennsylvania, annual, Philadelphia, Jan. 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Chicago Electrical Association* meets at Room 1737 Monadnock Building, Chicago, on the first and third Fridays of each month, at 8 p. m. J. R. Cravath, Secretary.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Locomotive Foreman's Club* meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *New England Railroad Club* meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736–1739 Monadnock Block, Chicago.

Saratoga, 1898.

The Executive Committees of the Master Car Builders' and Master Mechanics' Associations have agreed upon the place and time of the annual conventions of the two associations next year. They will be held at Saratoga Springs, N. Y.; the Master Car Builders' convention will open on Wednesday, June 8, and the Master Mechanics' on the following Monday, June 13.

New England Railroad Club.

The regular monthly meeting of the New England Railroad Club was held in Pierce Hall, Boston, Mass., Tuesday evening, Dec. 14, with President Medway in the chair. Mr. C. Peter Clark, General Manager of the New England Railroad, read a paper on "The Composite and Its Field," which included a description of the new composite car built by the Schenectady Locomotive Works for suburban traffic on the New England road (described in the *Railroad Gazette*) and some data of recent practical experiments.

Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held Dec. 6, at 8:15 p. m. Present 12 members, Vice-President Crosby presiding. Two proposed amendments to the constitution were discussed. Amendment to Article III. was put on its preliminary passage and carried. Amendment to Article I. proposing a change of name failed to pass on its first reading.

Mr. Powell suggested that a committee be named to confer with the City Charter Commission in regard to the office of City Engineer and the following committee was appointed on motion of Mr. Estabrook: Mr. Woodman, Mr. Powell, Mr. Crosby and Mr. Loweth.

New England Railroad Club.

At the meeting of this Club held on Tuesday evening, Oct. 12, Mr. J. L. Hirt, formerly Assistant Chief Engineer of the Metropolitan Traction Company, of New York, spoke on the subject of "Cable and Underground Electric Conduit Railways." The speaker's remarks were illustrated by lantern slides. A short discussion followed. Professor Allen asked the comparative cost of cable and electric working. Mr. Hirt replied that the cable cost 17 cents per car mile and the electric underground 7½ cents—evidently in New York, though that was not said.

At another meeting of the Club Mr. Hirt hopes to present a paper on "The Adoption of the Gas Engine for the Transmission of Power for Railroads."

St. Louis Railway Club.

A meeting of this Club was held in the parlors of the Southern Hotel, St. Louis, on Dec. 10, at which a discussion was held on the paper entitled "The Advancement of American Railways and What We May Expect in the Future," read by Mr. Jno. S. Thurman, Mechanical Engineer, Missouri Pacific, at the October meeting, and also a discussion on the paper entitled "English Railway Practice," presented at the November meeting by Mr. Geo. B. Leighton, President Los Angeles Terminal Railroad. A paper was presented by Mr. Frank Rearden, Superintendent Motive Power, Missouri Pacific, entitled "Railway Clubs."

On Friday evening, Dec. 10, a Christmas Tree Smoker was given by the associate members to the active members of the Club in the banquet hall of the Mercantile Club. Addresses were made by several people, and an entertainment with music was enjoyed.

Engineers' Club of Cincinnati.

At the November meeting a budget of short papers was presented as follows:

By Mr. W. B. Roland, on "Rebuilding the Pier of Bridge 135, on the Chicago Division of the C., C., C. & St. L. Ry., Over the White Water River." This pier was damaged by the high water of last spring to such an extent as to require the abandonment of the bridge during the time of rebuilding the pier and spans, and some peculiar and interesting problems were encountered in the foundation on account of the treacherous character of the material encountered.

Mr. Schuyler Hazard presented a paper on the "Pohlé Air Lift" as used by the C., C., C. & St. L. Ry. Co at Indianapolis for raising the water used at that place for the shops of the company and for supplying its locomotives. A general description of the workings of this mode of raising water from driven wells formed a feature of the paper quite interesting to those who were unfamiliar with it.

Mr. H. E. Warrington presented a paper on "Replacing the Rollers Under the 500-ft. and the 300 ft. Spans of the Ohio River Bridge on the Cincinnati Southern Railway." The peculiar feature of the work arose from the very heavy weight to be raised for the purpose of putting in the new rollers and the fact that special methods were required on account of the limited space on the piers for placing raising jacks. The old rollers had become rusted and filled with dirt to such an extent that they had become useless for the purpose for which they were intended.

Western Railway Club.

A regular meeting of the Western Railway Club will will be held at 2 p. m. on Tuesday, Dec. 21, 1897, in the Auditorium Hotel, Chicago.

The paper to be presented and discussed is entitled "Pooling Locomotives and Locomotive Crews." It is written by Mr. J. F. Deems, Master Mechanic of the C., B. & Q. R. R., at West Burlington, Ia. Advance copies of the paper have been sent to the members of the Club.

A subject for discussion, time not limited, is: "Is it desirable to use axles or bars made of iron and steel piled together?"

Included in the advance sheets are two engravings which were made from etchings of cross-sections of an axle. The axle was supposed to have been made from wrought iron, but the engravings show a bar of steel extending lengthwise of the axle and throughout its length. The few remarks given with the engravings will serve to direct the course of the discussion. The question of using bars made of steel and iron sandwiched together is becoming a very important one, because it is so difficult to separate steel and iron scrap. Some firms are offering such material to railroads and are urging strongly the advantages to be had from its use, therefore it is hoped to draw out a full and interesting discussion of the question.

The subject for 10-minute discussion is: "In view of the law pertaining to the height of drawbars and the penalties involved, are builders of cars justified in turning out cars the drawbars of which are more than 34½ in. above top of rail when the car is empty?"

The Railway Signaling Club.

The committee of this Club, appointed at the September meeting to gather information concerning certain details of construction of interlocking apparatus which were discussed at that meeting, has sent to members the following list of questions, to which answers are requested. The committee consists of Messrs. A. H. Rudd (N. Y., N. H. & H.), Frank Rhea (P., C., C. & St. L.) and W. W. Young. Answers should be sent to Mr. Rudd at Hartford, Conn.:

1. In designing a switch, especially for interlocking, what should be the distance from center of head rod to the point?
2. Should the lock rod be next the head rod or on the opposite side of the head tie?
3. Should connection be made to end of head rod or to a threaded rod working through a thimble attached to the former?
4. When slips are used, how should lock rods be connected?
5. Should shafts or cranks be used for operating the detector bars for slips?
6. What pattern lock should be used?
7. Under what conditions should slips be used?
8. Have you a standard rail brace for use under detector bars.
9. What style of distant signal repeater should be used?
10. Do you use selectors for any route?
11. Do you advocate their use?

12. (*a*) What signals should be provided with bolt locks? (*b*) Should the latter always be used with facing points or only when switches are between the signals and the tower?

13. Should pipe or wire be used for operating signals? Why?

14. What should be the length of standard signal arm?

15. What has been your experience with iron signal poles?

16. How should levers be grouped?

17. Should train order signals be interlocked?

18. Please make suggestions as to details of towers? (*a*) Tower framing. (*b*) Window arrangement. (*c*) Machine support and lead out timbers.

19. What method do you employ for checking operation of distant signals to prevent operators leaving them at caution when they should be cleared?

Engineers' Club of St. Louis.

On Dec. 1 the meeting was called to order at 8 p. m., with Vice-President Bryan in the chair. Thirty-nine members and eight visitors were present.

The Committee on Nominations, by its chairman, Mr. B. L. Crosby, reported the following nominations for 1898:

For President, Wm. H. Bryan; for Vice-President, B. H. Colby; for Secretary, Richard McCulloch; for Treasurer, Thos. B. McMath; for Librarian, E. J. Jolley; for Directors, Edward Flad and F. B. Maltby; for members of the Board of Managers of the Association of Engineering Societies, J. B. Johnson and Arthur Thatcher.

When this report had been read additional nominations were called for, and E. A. Hermann was nominated for Treasurer and John A. Laird for Director.

A motion was made and carried that the customary annual dinner be held on December 15.

Mr. B. L. Crosby made a motion to change section 3 of article 2 of the constitution in regard to the manner of electing honorary members. This motion called forth considerable discussion and several amendments were made to the original motion. Action on this motion was postponed, to be taken up later in the evening.

The paper of the evening, by Prof. Malverd A. Howe, entitled "Arches," was then read. A history of the stone arch was given, with a description of the arches found in the ruins of the ancient cities. The stone arch was traced down to modern times, and stereopticon views of famous arches were shown. A number of views of noted bridges in stone and steel were exhibited and interesting data concerning them was given.

At the conclusion of the paper, Prof. J. B. Johnson moved that a vote of thanks be extended to Professor Howe for his paper. The motion was carried.

Mr. Crosby's amendment to the constitution was then taken up. The motion as amended was as follows: "That section 3 of article 2 of the constitution be amended to read as follows: Honorary members shall be persons eminent in engineering or mechanical science, and shall be elected upon the recommendation of the Executive Committee, by letter ballot, which shall be sent to the members at the same time as the ballot for the annual election of officers. Ninety-five per cent. of the votes cast for the candidate must be in his favor to insure election. Honorary members shall be entitled to all the privileges of members, excepting the right to vote and hold office, and shall be subject to no fees or assessments of any kind." This motion upon being put to a vote was carried by two-thirds majority.

The Engineers' Club of Philadelphia.

A business meeting of the Club will be held on Saturday, Dec. 18. There will be a topical discussion on "A Better House for the Engineers' Club of Philadelphia," opened by the report of the Special Committee on New Club House.

At the meeting of Dec. 4 nominations for officers for 1898 were presented as follows:

For President, Edgar Marburg, L. Y. Schermerhorn; for Vice-President, Wm. C. L. Eglin; for Secretary, L. F. Rondinella; for Treasurer, George T. Gwilliam; for Directors, W. Copeland Furber, Edwin F. Smith, L. Y. Schermerhorn, R. L. Humphrey, R. L. Humphrey, C. H. Ott.

The paper of the evening on "Moving the Pennsylvania Railroad Bridge over the Schuylkill River" was presented by Mr. Joseph T. Richards, who illustrated his remarks by a large series of drawings and photographic views projected by the electric lantern.

The new span is a double-track deck Pratt truss, 235 ft. 7 in. long, c. to c. of end pins, consisting of 11 panels of 21 ft. 5 in. each, 25 ft. 9 in. in depth, the trusses being spaced 19 ft. apart, c. to c. The total weight of both spans, including floor systems and track as moved, was about 1,250 tons. The old metal span was as a Linville truss, being a double intersection, or Whipple type. The method of renewal was to build the new span, complete, alongside of the old one, and move it in place and the old out between trains.

The preparations for moving all went on during the erection of the new span, so that by the time the latter was completed everything was in readiness for the interchange of the two spans. Six ordinary 85-lb. track rails were laid in their normal position on substantial framing, reaching across the bridge seats, and upon them a nest of continuous rollers was placed. One hundred and thirty-six of these rollers were used under each end of the spans. The power to move the spans was supplied by four engines, so placed as to have a maximum capacity of 50 H. P. at each end of the bridge.

As there was a clearance of but 4 in. between the masonry and the top chords of the bridge, it was important that the two ends should travel at the same rate in moving the necessary distance of 27 ft., and two recording devices were adopted to maintain this regularity.

Sunday, Oct. 17, 1897, was set as the day for moving the bridge. An eastbound train passed over it at 2:57 p. m.; the track was broken at 2:58; both spans started to move at 2:59; the old span was moved out and the new one was in position at 3:01 and 28 seconds. At 3:08 the eastbound track and at 3:10 the westbound track was connected ready for trains. No accident or delay of any kind occurred in connection with the operation.

PERSONAL.

—Mr. R. Boyle, Roadmaster of the Texas Midland at Terrell, Tex., has resigned.

—Mr. S. A. Spencer, Trainmaster of the Baltimore & Ohio, at Connellsville, Pa., has resigned.

—Mr. Shaw Stevens, Master of Transportation of the Wabash, has resigned on account of ill health.

—Mr. John G. James, Assistant General Freight Agent of the Lake Shore & Michigan Southern, died at Pueblo, Colo., Dec. 7.

—Mr. R. A. Robinson died at his home in Louisville, Ky., Dec. 9, aged 80 years. He was a Director of the Louisville & Nashville.

—Mr. James Burke, heretofore Soliciting Freight Agent of the Cincinnati, New Orleans & Texas Pacific with headquarters at Cincinnati, O., resigned Dec. 1.

—Mr. William Appleby died at his home in Chester, Pa., Dec. 10, aged 62 years. He was a director of the Chester Traction Co. and the Johnson Frog & Switch Works.

—Mr. Henry H. Adams, formerly Treasurer of Kings County, died from paralysis at his home, Brooklyn, N. Y., Dec. 9. He was President of the Brooklyn & Rockaway Beach Railroad.

—Mr. Clifford Lewis, Jr., Inspector of the Block Signal System on the Mohawk Division of the New York Central & Hudson River, has been appointed City Surveyor of Utica, N. Y.

—Mr. Benedict P. Robson, at one time Passenger Agent of the Memphis & Charleston and later General Manager of the Ripley Narrow Gage, now the Gulf & Chicago, died at Little Rock, Ark., Dec. 1, of Bright's disease.

—Mr. F. P. Boatman, Master Mechanic of the Columbus, Sandusky & Hocking shops, has resigned. Mr. Boatman was for seven years Superintendent of Motive Power and Master Mechanic of the Omaha & St. Louis.

—Mr. Charles Mettam died at his home in Bayonne, N. J., Dec. 5, aged 78 years. He was an Architect and Civil Engineer; he served under General Delafield on the construction of the fortifications of New York Harbor in 1861.

—Dr. Armand J. De Rosset died at his home at Wilmington, N. C., Dec. 9. He was one of the original subscribers to the stock of the Wilmington & Weldon, now a part of the Atlantic Coast Line, and for 55 years was one of its Directors.

—Mr. Archie H. Maxwell died of Bright's disease at Altoona, Pa., Dec. 8. He was born in England in 1819, and was made foreman in 1853 of the foundries of the Pennsylvania Company at Altoona, which position he held until his death.

—Mr. W. P. Trickett, Commissioner of the Kansas City Transportation Bureau, has been re-elected for another year, and has had his salary raised to $3,000. Mr. Trickett has been with this Bureau for over seven years, having been Secretary under the former Commissioner.

—Mr. Edward W. Thompson, heretofore Traffic Manager of the Baltimore Steam Packet Co., operating the Bay Line of steamers, has resigned. He was at one time New England Passenger Agent of the Chicago, Rock Island & Pacific, and more recently Division Superintendent and Commercial Agent of the Central Vermont.

—A dinner was given to Mr. George B. Post on Wednesday evening of this week, celebrating his sixtieth birthday. The dinner was given by the Architectural League of New York in the Vanderbilt gallery of the American Fine Arts Society Building. It was largely attended, was very handsome and an interesting occasion and must have been very gratifying to Mr. Post.

—Mr. Daniel Candee, who in recent years was engaged extensively in railroad contract work, died at Syracuse, N. Y., Dec. 9, aged 72 years. He built a part of the New York Central main line between Syracuse and Rochester, and in company with the late Henry J. Mowry had large contracts for the construction of the West Shore. Until 1882 he was an active politician, and held various elective and appointive offices.

—Mr. David W. Dickson, President of the Philadelphia Traction Co., died suddenly Dec. 12, at his home in Philadelphia. He first become connected with the street railroad business in 1878, when he was made Treasurer of the West Philadelphia Passenger Railway Co. Upon the formation of the Philadelphia Traction Co., he was elected Treasurer of that company, in which capacity he served until the formation of the Union Traction Co. In November, 1896, he was made President of the Philadelphia Traction Co.

—Prof. Waldemar Lindgren has been appointed Professor of Metallurgy and Mining Engineering at Stanford University, California. He is a native of Sweden and was graduated with honors from the Freiberg School of Mines, in Saxony, in 1883. For a time he was Geologist for the Northern Pacific and was later connected with smelting works in Helena, Mont. Then he became General Assistant in the Anaconda copper mines, in Butte, Mont., and has since been connected with the United States Geological Survey.

—Mr. Gardiner G. Hubbard, a director in the Bell Telephone Company, died at "Twin Oaks," his suburban residence, a few miles from Washington, D. C., Dec. 11. His death was due to a complication of diseases. He was 76 years of age. Mr. Hubbard early became interested in the Bell Telephone, and in 1878 retired from practice of the law to devote himself to its interest. He was appointed by President Grant a Special Commissioner to report on Railroad Mail Transportation, and instituted reforms in the railway mail service, an earnest and persistent advocate of a Postal Telegraph System under government control, also a strong advocate of government ownership of railroads.

—Mr. Edwin G. Nourse, Assistant Engineer, in charge of construction of the new bridge of the Davenport & Rock Island Bridge & Terminal Co., was killed on Dec. 8 at Rock Island, Ill., by a falling derrick. Mr. Nourse was 49 years of age, and had been for many years prominently identified with river improvements, and with the Atchison, Topeka & Santa Fe, the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul roads. He was also connected with the building of the big bridge at Minneapolis and had charge of the construction of the terminal tracks at the World's Fair at Chicago. He was a member of the American Society of Civil Engineers and of the Western Society of Engineers.

—Mr. Carter C. Wheeler, formerly President of Chicago, Fort Madison & Des Moines, died at Chicago, Ill., Dec. 14. Mr. Wheeler commenced railroad service about 1850 as a Clerk on the Rutland, and was for several years General Freight Agent of the Chicago & Alton, then General Superintendent of the Chicago & Milwaukee until the consolidation of that road with the Chicago & Northwestern, when he was made General Freight Agent. He was also General Freight Agent of the Michigan Central and later Assistant General Superintendent of the Chicago & Northwestern. In June, 1880, he became Assistant General Manager of the Chicago & Northwestern and held this office until July, 1881, when he was appointed General Manager of the Atchison, Topeka & Santa Fe. He was General Superintendent of the Chicago & Northwestern from December, 1883, until August, 1887, and was elected President of the Chicago, Fort Madison & Des Moines in 1890. He also acted as arbitrator in several important railroad controversies.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—Henry Spencer, son of President Samuel Spencer, has been appointed Assistant Superintendent, with headquarters at Birmingham, Ala.

Atchison, Topeka & Santa Fe.—The second annual meeting of the stockholders of the reorganized company was held in Topeka, Kan., Dec. 9. It differed from the first meeting in that Directors were chosen in four classes—for one, two, three and for four-year terms. The old Directors were re-elected throughout for different terms as follows: For one year, Edward P. Ripley, Aldace F. Walker, William Rotch, Cyrus K. Holliday; for two years, H. Risman Duval, Thomas P. Fowler, Charles S. Gleed, Victor Morawetz; for three years, Edward J. Berwind, George A. Nickerson, R. Somers Hayes, Thomas A. Osborn, and for four years, George G. Haven, Edward N. Gibbs and Benjamin P. Cheney.

Baltimore & Ohio.—David Lee, Superintendent at Zanesville, O., has been elected a Director of the Pittsburgh, Cleveland & Toledo, a part of the Baltimore & Ohio.

I. N. Kalbaugh, Superintendent of Motive Power at Baltimore, Md., has been appointed Superintendent of the Car Department, vice E. W. Grieves, resigned.

Boston Elevated.—J. A. L. Waddell, Civil Engineer, of Kansas City, Mo., has been appointed Consulting Engineer. George A. Kimball, Civil Engineer, of Boston, has been appointed Chief Engineer.

Chesapeake & Ohio.—C. O. Stimson, heretofore Division Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis at Lafayette, Ind., has been appointed Assistant General Freight Agent, with headquarters at Cincinnati, O.

Chicago & Southeastern.—A. C. Campbell, of St. Louis, Mo., has been appointed Receiver by the Supreme Court. He will move the offices from Anderson, Ind., to Brazil, Ind.

Chicago & West Michigan.—J. B. Wendell has been appointed Traveling Freight Agent of this road and the Detroit, Grand Rapids & Western, with headquarters at Minneapolis, Minn.

Chicago Great Western.—J. P. Harrison, General Freight Agent at Minneapolis, Minn., has been made Local Agent in addition to his present duties. L. C. Rains, Freight Agent at Minneapolis, has been appointed Superintendent of Terminals at Oelwein, Ia.

Chicago, Peoria & St. Louis.—At the annual meeting of the stockholders, held at Springfield, Ill., Dec. 13, Elenerous Smith, of St. Louis, Mo., was elected a Director, to succeed Charles E. Jackson, of Middletown, Conn., resigned.

Cincinnati, Hamilton & Dayton.—J. G. Mason, heretofore District Passenger Agent at Cincinnati, has been appointed General Southern Agent at Cincinnati, succeeding John S. Leahy, transferred to Las Vegas, N. Mex. John Williamson, Ticket Agent at Cincinnati, has been appointed to succeed Mr. Mason. Park Cowen has been appointed Advertising Agent. Frank Wade has been appointed Traveling Passenger Agent, with headquarters at Indianapolis, succeeding Walter J. Nichols, promoted. (See this column for last week.)

Cincinnati, New Orleans & Texas Pacific.—Elmore E. Mack, heretofore Soliciting Agent at Chattanooga, has been appointed Traveling Freight Agent, with headquarters in the same city.

Flint & Pere Marquette.—E. C. Martin has been appointed Assistant Trainmaster, to take effect immediately. This is a new office. Mr. Martin has been an employee of the road for the past 16 years.

Fort Worth & Denver.—F. A. Kennedy, heretofore Agent at Amerillo, has been appointed General Live Stock Agent at Fort Worth, Tex., to succeed Charles L. Ware.

Grand Trunk.—J. H. Hannah, heretofore Assistant Foreign Freight Agent at Toronto, Ont., has been appointed Division Freight Agent with headquarters at Stratford, Ont., succeeding F. J. Watson, promoted. (See this column for last week.)

Houston East & West Texas.—At the annual meeting of the stockholders, at which all the stock was represented, held at Houston, Tex., Dec. 7, N. S. Meldrum, of Houston, was elected a Director, succeeding M. G. Howe. Directors' meeting was held at Houston, Dec. 14, to elect officers.

Illinois Central.—E. J. Ashburn has been appointed General Live Stock Agent at Fort Worth, Tex.

Intercolonial.—J. H. Hardwell, heretofore Chief Clerk to M. E. Tiffin, the Canadian Pacific Freight Agent, has been apppointed Division Freight Agent of the Intercolonial, with headquarters at Montreal. The appointment to take effect Jan. 1.

Kansas City, Pittsburgh & Gulf.—John M. Savin, of Quincy, Ill., General Manager of the Omaha, Kansas City & Eastern, the control of which has been assumed by the Kansas City, Pittsburgh & Gulf, noted in these columns last week, has been appointed General Superintendent of the Omaha, Kansas City & Eastern in addition to his other duties.

Walter W. Avery, heretofore Chief Clerk of the Passenger Department at Kansas City, Mo., has been appointed Assistant General Passenger Agent with headquarters at Kansas City. W. F. Griffiths, Chief Rate Clerk, will succeed Mr. Avery.

Lake Shore & Michigan Southern.—M. E. Newell has been appointed Northwestern Freight Agent, with headquarters at St. Paul, Minn., to succeed J. E. James, deceased.

New Orleans & Northwestern.—At a meeting of the Directors at Natchez, Miss., held Dec. 7, Louis K. Hyde, Receiver for the company, was elected Vice-President, and Frank Delancey Hyde, formerly First Vice-President, was elected Second Vice-President.

Northern Pacific.—T. J. De Lamere has been appointed Superintendent of Car Service and the office of Car Accountant has been abolished since Dec. 1.

Oregon Railroad & Navigation Co.—Colonel William Crooks, heretofore Chief Engineer of the Minneapolis & St. Louis, at Minneapolis, has been appointed Chief Engineer of the Oregon Railroad & Navigation Co.

Peoria, Decatur & Evansville.—B. T. Breckinridge, heretofore Chief Clerk of the Passenger and Freight Department, with headquarters at Evansville, Ind., has been appointed Traveling Passenger and Freight Agent with headquarters at the same place.

Pittsburgh, Bessemer & Lake Erie.—H. T. Porter, heretofore Engineer of Maintenance of Way at Greenville, Pa., has been appointed Chief Engineer, with headquarters at Pittsburgh, Pa., succeeding Francis E. House, promoted. (See this column for Oct. 1.)

Pittsburgh, Cleveland & Toledo.—At the annual meeting of the stockholders of this road, a leased road of the Pittsburgh & Western, held at Youngstown, O., Dec. 7, it was voted to decrease the number of directors of the road from twelve to seven. The new members of the board were elected as follows: Orlando Smith, Cincinnati; Thomas M King, Philadelphia; John K. Cowan, Baltimore; John T. Terry, New York; Henry W. Oliver, Allegheny City, Pa.; David Lee, Zanesville, and Joseph Chapman, Zanesville, O.

Plant System.—F. B. Papy, General Freight Agent at Savannah, Ga., has been appointed Local Freight Agent and Superintendent of Terminals, with headquarters at Savannah, the office of General Freight Agent being abolished.

St. Paul & Duluth.—C. E. Mann has been appointed Paymaster, succeeding I. L. McClung.

Seaboard Air Line.—Joseph Strang, formerly New England Passenger Agent, with headquarters in Boston, Mass., has been appointed to Assistant Chief Industrial Agent at the general office of the company at Portsmouth, Va. He will be succeeded by Charles L. Longsdorf, late Traveling Passenger Agent at Philadelphia.

Southern.—H. A. Lawson, formerly in the Boston office of the Pennsylvania, has been appointed City Passenger Agent at Boston, Mass., of the Southern.

Southern Indiana.—Alexander Shields, Master Mechanic of the Chicago, Hammond & Western, has been appointed Master Mechanic, with headquarters at Bedford, Ind.

Texas Midland.—U. R. Smithime has been appointed Master Mechanic at Terrell, Tex., to succeed B. R. Hanson. Appointment took effect Dec. 1.

Wabash.—Shaw Stevens, Master of Transportation, having resigned, the office has been abolished.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Alabama & Tombigbee.—This company has been incorporated in Alabama to build a line from Peach Tree, Ala., to Coffeeville. Among those interested are: George C. Burr and F. Van Buren, of New York; George S. Van Buren and Charles M. Dunn, of Fulton, Ala.; W. H. Thomas and Fred S. Ball, of Montgomery, Ala.

Allegheny Connecting.—This company was incorporated in Pennsylvania Dec. 11, with a capital stock of $120,000 to build a line from a point in Plum township, Allegheny Co., on the Pittsburgh, Bessemer & Lake Erie at or near the Allegheny River Bridge, northeast about 12 miles to a point in Harrison township. The directors are: Robert V. Fulton, Pittsburgh, Pa., President; J. A. Reha, Jos. P. Welsh, Edw. H. Gerlfuss, D. R. Hill, H. E. Earley, all of Pittsburgh; Wm. H. Wormsley, Allegheny.

Canada Atlantic.—It is officially stated that the 9½ miles from Lacolle Junction, Quebec, to Alburgh Springs, Vt., has been completed. (See this column for Oct. 29.) From Alburgh Springs the company uses the line of the Central Vermont, which portion has been capitalized, the Canada Atlantic paying interest on one-half the cost of the road and one-half the cost of maintenance, having equal rights with the Central Vermont for the use of the same. At Swanton the Canada Atlantic is building terminals comprising 6½ miles of track, upon which 300 men and 40 teams are at work. The bridge, 1,500 ft. long, across the Richelieu River, has been completed. E. J. Chamberlin, of Ottawa, Ont., is General Manager.

Canadian Pacific.—The Slocan branch from Slocan, B. C., a point on the Columbia & Kootenay division, north 23 miles to Slocan Lake was formally opened for business Dec. 6. It is reported that the Canadian Pacific will soon begin work on an extension from Robson along the Columbia River and up Murphy Creek to Rossland, 25 miles.

Cleveland, Akron & Columbus.—The work of filling in trestles between Orrville and Warwick, O., has been nearly completed and work has been suspended for the winter. This improvement was begun nearly two years ago.

Dayton & Faunsdale.—This company has been incorporated in Alabama with a capital stock of $750,000 to build a line from Dayton, northeast about 10 miles, to Faunsdale, a point on the Southern, with branches into the Warrior and Brockton coal-fields. G. L. Sibbons, of Dayton, Ala., is President.

Great Northern.—It is reported that about 2,000 men are at work on the extension of the Fosston branch from Fosston, Minn., east toward Duluth. A number of bridges will be required at Carlton, Wrensall and near Thompson. (See this column for Oct. 29.)

Gulf, Brasos Valley & Pacific.—It is reported that rails are now laid to Mineral Wells, Tex., and that the road will be completed to Henrietta, in Clay County, by July next. When completed the road is to extend from Henrietta south through Mineral Wells to Waco and then down the Brazos River to Velasco. W. A. Squires, of Henrietta, Tex., is President.

Gulf, Louisiana & Great Northern.—It is reported that Joseph Waitz, President of this company, has let the contract for the entire line of road which is to run from a point on Vermillion Bay, La., north to Fort Smith, Ark. It is stated that work will begin within 30 days.

Jonesboro, Lake City & Eastern.—It is reported that the section of this road from Nettleton, Ark., east to Lake City, 12 miles, has been completed and is in operation, and that surveys will be made at once for extensions from Lake City east to Osceola, about 28 miles, and from Nettleton west to Jonesboro, four miles. A. J. Kerfoot, of Jonesboro, is General Manager. (See this column for June 18.)

Kansas City, Pittsburg & Gulf.—President A. E. Stillwell is reported to have made the announcement that this company will build an extension northeast from Quincy, Ill., to Peoria, about 100 miles, and that this extension will be used as a connecting link with some road to the east.

Mexican Roads.—Capt. Alfonso B. Smith, of Los Angeles, Cal., has received a concession from the Mexican government to build a railroad from San Jorge northwest 76 miles along the head of the Gulf of California and up the Colorado River to the national boundary, and from that point north to Yuma, Ariz., 18 miles. The right of way throughout the entire route has been obtained and the concession allows the builders to continue the road 700 km. (435 miles) to Guaymas. At Yuma connection will soon be made with the Utah Southern and at Acapulco by water with the Mexico, Cuernavaca & Pacific. From San Jorge a line of steamers will be run to Salina Cruz on the Pacific coast in Southern Mexico. It is stated that surveys were to begin not later than Dec. 15. It is proposed to put steamers on at an early date and to complete the road to the Arizona border within six months.

Mexico, Cuernavaca & Pacific.—The section of this road from the City of Mexico southwest to Cuernavaca was formally opened by President Diaz, Dec. 11. The train service consists of passenger trains each way per day. The entire line as projected is to extend from the City of Mexico through Iguala to the Pacific coast. G. A. Stranahan, of the City of Mexico, is Construction Engineer. (See this column for Oct. 8.)

Michoacan & Pacific.—It is officially stated that grading has been completed on this line for 15 km. (9.3 miles) from Yurecuaro, Mex., a point on the Mexican Central, southeast through Zamora, Tinquindin, Los Reyes, Uruapan and Teretan to Ario, 300 km. (186 miles). This work has not been actively pushed up to the present time, but beginning Jan. 1 the company intends to put a large force at work and rush the construction through to Ario. The work will be done by the company. A French company, whose financial backers are the Rothschilds, is intending to build a line to the Pacific Ocean from some point between Uruapan and Ario, presumably Zihuatenejo. Robert R. Symon, of No. 2 Suffolk lane, Cannon street, London, is Chairman of the Board of Directors. L. R. Gordon is General Superintendent, and W. O. Titus Chief Engineer, both of Zitazro, Mex. (See this column for Aug. 9.)

Milwaukee, Benton Harbor & Columbus.—About 7 miles of rails have been laid beside the narrow gage track on the South Haven & Eastern line recently acquired by this road. (See these columns for Nov. 12.) This narrow-gage road runs from South Haven, Mich., southeast to Lawton, 37 miles.

Minneapolis, Anoka & Rainy Lake.—This company was incorporated in Minnesota Dec. 4, to build a line from Minneapolis north through Anoka, Cambridge and Mora to Grand Rapids, a point on the Duluth, Superior & Western, about 200 miles. The incorporators are: Senator Washburn, Ex-Governor John S. Pillsbury, Judge M. B. Koon and C. C. Crane, all of Minneapolis; D. C. Dunham, of Anoka, and Henry F. Barker, of Cambridge.

New Roads.—It is reported that bids have been called for to build a road from Little Tunnel, Ky., a point on the Lexington & Eastern, northeast about 10 miles to Frozen Creek. The road is to be built for M. H. Courtney, of the Central Lumber Co., of Clay City, Ky., and is to be used as a lumber road.

It is stated that the Consolidated Coal Company has decided to build the road connecting Guthrie, Okla., with the St. Louis & San Francisco. This company has absorbed the Arkansas Valley, Guthrie & Western, which was organized early in 1896 to build a road from Fort Smith, Ark., west through Guthrie to Sapulpa, N. Mex. Eleven miles of the road has been graded and ties laid and the rails are on the ground. It is stated that this portion of the road will be in operation by Dec. 20, and that the entire line from Guthrie to Red Fork, Ind. Ter., on the St. Louis & San Francisco, a distance of 100 miles, will be in operation July 1898. Guthrie citizens have given $50,000 toward the road. When this link is completed the distance from Guthrie to St. Louis will be shortened by about 75 miles.

New York & Ottawa.—Work on the Canadian side from Cornwall, northwest 58.7 miles to Ottawa, is rapidly approaching completion. Track has been laid to within six miles of a point where the road crosses the Canada Atlantic, and it is expected that it will soon reach Cornwall. Sooysmith & Co., of New York, have suspended work for the season on the bridge over the south channel of the St. Lawrence, but work will be rushed along on the bridge with the opening of spring.

Northern Pacific.—It is reported that an order to avoid the necessity of maintaining a ferry over the Columbia River at Kalama, Or., this company will build a road south along the river to Vancouver, about 35 miles, thence across a bridge and into Portland, probably over the tracks of the Oregon Railroad & Navigation Co.

Ohio Valley & Junction.—It is reported that work has been begun on this line in Tuscarawas County, O., from Beech City south, about 12 miles, through Stroudsburg to Dover. (See this column for Nov. 12.)

Omaha & Oregon.—Senator Allen, of Nebraska, has introduced a bill at Washington granting to this road the right of way across the Omaha and Winnebago reservations, in Nebraska. The bill provides that the road shall be built within three years after the approval of the act, and permits the erection of three stations on the reservations. The right of way is to be 100 ft. wide. This road was incorporated some months ago (see this column for July 30) to build a line from Omaha, Neb., northwest along the Missouri valley, 140 miles to a point opposite Yankton, S. Dak.

Pembroke Southern.—It is reported that James Fowler, American Consul at Arnprior, Ont., has obtained the contract for building this road, which is to extend from Pembroke, Ont., a point on the Canadian Pacific, southwest about 21 miles to Golden Lake, on the Canada Atlantic. (See this column for Oct. 29.) It is further stated that contracts for material, etc., will be given out at once, and that work will be begun as soon as possible. William Russel, Jr., of Pembroke, is Chief Engineer.

Pennsylvania.—Sealed proposals were received up to Dec. 13 for the necessary grading and masonry for sections of additional track on the eastern slope of the Allegheny Mountains, between Bennington and Altoona, Pa. The intention is to make three tracks complete from Bennington to Kittanning Point, and four tracks from that point to Altoona. This will require grading for 10 miles of single track, and comprise about 360,000 cu. yds. of excavation.

Bids were also received for rebuilding the arch in the new Portage tunnel through the Allegheny Mountains, and widening out the western approach; to lay a double track through the tunnel and over the western approach. This is a tunnel that was bought from the state of Pennsylvania with the old main line, and it is too narrow for modern equipment. It is about 1,650 ft. long, and built through the mountain at a higher elevation than the present tunnel on the main line.

Penn Yan & Pennsylvania.—It has been officially stated that this company, whose incorporation was noted in this column Oct. 8, proposes to begin work on the section of road from Savona, N. Y., northeast to Wayne, 16 miles. This section is nearly all graded, being an old roadbed, and is for the most part in excellent condition to lay track. The company expects to do the work by the day through the winter if the weather permits. The balance of the route from Wayne to Penn Yan, 17 miles, will be entirely new work, and will be let by contract to commence early in the spring. This section will be neither difficult nor expensive. There will be a few iron and steel bridges, none of them large, and the grade is very light, scarcely any (with the exception of two miles) as high as one per cent. There will be but very few curves, and these very easy. The survey has not been entirely completed. The road is to run from Savona through Bradford, Tyrone, Weston, Wayne, Keuka and Crosbey to Penn Yan, 33 miles. The road follows the great belt of Lake Keuka, and reaches prominent summer hotels and cottages on the lake. J. D. Nares, of Corning, N. Y., is among those interested.

Pickens County.—It is reported that contracts for building and equipping have been let and work has been begun on this road, which is projected to extend from Pickens, S. C., about 12 miles east to Easley. (See this column for April 23.)

Pittsburgh, Bessemer & Lake Erie.—It is reported that this company has advertised for 50 men for winter's work at track-laying, and that rails on the entire section from Butler, Pa., to Albion, will be replaced with those of 100 lbs. weight as fast as possible.

Pochuck.—It is reported that work has been begun on this road, which is to extend from the quarries of the Empire Granite Co., at Pochuck Mountain, N. Y., north about 3¼ miles, to a point on the Lehigh & New England. (See this column for July 3.)

Portland, Vancouver & Yakima.—This company has been incorporated as successor to the Vancouver, Klickitat & Yakima and has taken over all the property of the old company. The sale includes the right of way, trackage, rolling stock and all other property of the old company, beside two mortgages aggregating $32,600, which were given to E. L. Canby, Trustee, to secure the first mortgage bondholders. The conditions of the purchase are that the new company shall immediately proceed to put the road in first-class condition, to extend it to a distance of one mile, including a spur of equal length, and equip the line with all necessary rolling stock. It is further agreed that the line is to be extended to Yakolt Prairie, Wash., a distance of 30 miles, within three years from Dec. 1, 1897.

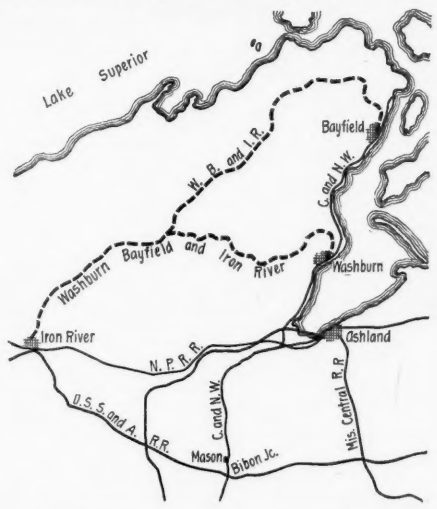
Rio Grande, Sierra Madre & Pacific.—Official denial is made of the report which appeared in this column Nov. 12, that this company is making a survey for proposed extension from Casas Grandes southwest, about 300 miles, to the Pacific.

Southern Pacific.—It is reported that R. H. Downey & Bro., of Houston, Tex., have obtained a contract for building the extension of the St. Martinsville branch in Louisiana from St. Martinsville northwest, about 24 miles to Arnaudville (See this column for Nov. 26), and that work is to begin at once. It is reported that contracts have been laid for building a branch five miles long from Montalvo, Ventura County, Cal., to a new sugar factory.

Speedwell Lake.—This company has been formed to build about one mile of track from the present terminus of the Rockway Valley in the center of the city of Morristown, N. J. R. B. Moriarty is President and Manager of the new company, which will collect tolls on freight and passengers from the Rockway Valley. The Rockway Valley extends from Whitehouse, N. J., to Morristown, 25 miles, and will operate the new extension.

Springfield, Little Rock & Gulf.—It is reported that the business men of Springfield, Mo., have offered $100,000 and terminal facilities to this company for its proposed line from Springfield south through Little Rock, Ark., to Alexandria, La. According to the terms of the Smith bill passed by the Arkansas Legislature at its last session, work must begin on this road in Arkansas by Dec. 26, and upon the completion of the road the company is to receive 1,000 acres of land for each mile in the State of Arkansas.

Washburn, Bayfield & Iron River.—It is officially stated that 10 miles of rails has been laid from Bayfield, Wis., toward Iron River, and the company is now laying 70-lb. rails from Washburn toward Iron River, and expects to lay 10 miles from Iron River toward Bayfield and Washburn before Jan. 1. The intention is to complete the road the early part of the summer. The R. D. Pike Lumber Co., of Bayfield, Wis., is building the road. (See this column for Nov. 5.)



Washburn, Bayfield & Iron River Railroad.

Tavares & Gulf.—This company has under consideration the building of about 6½ miles additional road from the terminus at Oakland, Fla., east to Ocoee. The present line runs from Taveres southeast to Oakland, 28

miles, with a branch from Wait's Junction to Clermont, 6½ miles. W. B. Tucker, of Orlando, Fla., is General Manager.

Ventura & Ojai Valley.—It is reported that grading has been completed on this road from Ventura, Cal., north 18 miles to Nordhoff, and that track-laying is in progress. (See this column for Aug. 13.) Grant Bros., San Francisco, have the contract.

Vining & Coleman.—The Gulf, Colorado & Santa Fe states that the company has agreed to sell the Vining & Coleman Co. rails for building its line, to be delivered some time next spring. It is denied, however, that the Gulf, Colorado & Santa Fe has entered into the agreement (as stated by some of our contemporaries) to build, equip and operate this road. The Vining & Coleman was incorporated at Austin, Tex., on Feb. 11, 1895, with a capital stock of $30,000, to build a line from Coleman, on the Gulf, Colorado & Santa Fe, south about 30 miles to the Vining coal mines on the Colorado River near the township of Waldwrip. W. L. Vining, of Austin, Tex., is largely interested in the new road.

Wheeling & Lake Erie.—The extension of this road from Martin's Ferry Water-Works, at Martin's Ferry, O., to Martin's Ferry Furnace, 0.84 mile, has been completed. (See this column for Oct. 15.) This extension is to be used for switching service only.

Electric Railroad Construction.

Albert Lea, Minn.—Local capitalists, including Mr. G. L. Carrington, have secured a franchise for building an electric railroad from Albert Lea to Geneva, 15 miles. The road will run along the county road, passing through the towns of Bancroft and Clark's Grove. The line will carry passengers, freight and mails. The fare from Geneva to Albert Lea is fixed at 20 cents, with proportionate fares for short distances. The cost of the line is estimated at $150,000.

Beaver Falls, Pa.—The line of the Riverview Electric Street Railway Co. has been completed. The road is about two miles long and begins at the Pittsburgh & Lake Erie Railroad station and extends to the new town of Riverview.

Bobcaygeon, Ont.—It is proposed to build an electric railroad from Bobcaygeon to Peterborough. The cost is estimated at $200,000.

Centralia, Pa.—The question of granting the right of way to the Ashland & Centralia Railway Co. was recently under discussion and a committee consisting of James L. Reese, Wm. Jones and Michael Madaken was appointed to confer with the railroad company.

Chicago.—On Dec. 8 the contract was closed with Mr. F. J. Sprague, of New York, for $275,000, to change the motive power to electricity on the North Side elevated.

Doylestown, Pa.—The stockholders of the Doylestown & Willow Grove Trolley Co. held a meeting last week and elected the following directors: George P. Brock, President; Carrol R. Williams, Secretary and Treasurer; Joseph Jones, Wm. N. Wamsley and Samuel Steckel.

Elgin, Ill.—An electric road is proposed north from Carpentersville to Elgin by the Elgin City, Carpentersville & Aurora Electric Railroad Co.

Ellwood City, Pa.—Park Gate & Ellwood Street Railway Co., capital $25,000, is to build a line 3 miles long from Park Gate, Beaver County, to Ellwood City, Lawrence County. Directors: Thos. Dugan, Elwood City, President; J. R. Phillips, J. W. Wickum, J. F. Coil, Ellwood City, and Jno. S. Hays, Newcastle. The last-named holds 400 of the 500 shares.

Hamilton, Ont.—Mr. Charles J. Myles, President of the Hamilton, Grimsby & Beamsville Electric Railway Co., informs us that nothing will be done until Spring in the construction of the electric road from Beemsville to St. Catherine. The company is now building the power plant near the latter place to generate electricity by water power, the fall being 248 ft. The power is to be used also for factories and street lighting in Hamilton, and until this company is ready to furnish sufficient power to run the cars of the electic road no construction work will be done.

Hannibal, Mo.—Mr. D. Thomson, President of the Hannibal, Palmyra & New London Electic Railroad Co, writes us that the prospects for extending the line to Palymra are very promising, but that it will depend entirely on the ability of the company to float its bonds. Besides this extension, it is proposed to make many improvements, and also to extend the line to New London.

Harrisburg, Pa.—The Harrisburg & Mechanicsburg Electric Railway Co. is pushing work on its extension from White Hill to Shiremanstown. The Philadelphia & Reading has temporarily enjoined the company from crossing its tracks at White Hill in Mechanicsburg.

Ithaca, Mich.—Mr. George P. Stone, of Ithaca, writes as follows: "The Lansing, St. Johns & St. Louis Railway Co. recently filed its articles of incorporation. The capital stock is $250,000, which amount has all been paid in. The Board of Directors is composed of M. V. Montgomery, F. L. Dodge and Jacob Stahl, of Lansing; Isaac Hewitt, of Maple Rapids; Geo. P. Stone, of Ithaca; A. B. Darragh and Stiles Kennedy, of St. Louis. The officers are M. V. Montgomery, President; Isaac Hewitt, Vice-President; F. L. Dodge, Secretary, and A. B. Darragh, Treasurer. The proposed line is from Lansing to St. Louis, in Gratiot County, via Dewitt, St. Johns, Maple Rapids, Pompei and Ithaca, a distance of about 54 miles, passing through a rich and well developed country. At present this section is without any north or south railroad facilities, and a part having none whatever. The proposed line intersects the Grand Rapids & Western at St. Louis and the Ann Arbor at Ithaca, Toledo, Saginaw & Muskegon at Pompei, Detroit, Grand Haven & Milwaukee at St. Johns, and various Michigan and interstate roads at Lansing. The number of people residing within a mile of the proposed line, exclusive of the city of Lansing, is not less than 25,000. The line is nearly north and south, deflecting about five miles to the west to reach Maple Rapids, and connects Lansing, the capitol of our State, with St. Johns and Ithaca, the county seat of Clinton and Gratiot counties, respectively. It is proposed to run the line into public highways principally, and the work of securing the necessary franchises is already under way. The line passes through, in its entire distance, a country remarkably level and requires but very little grading. It is believed that the road will be a valuable feeder to the steam railroad which it intersects. The construction work will be commenced early in the spring, and probably sooner, if severe winter weather does not prevent."

Louisville, Ky.—The Louisville & Nashville Railroad is not arranging to build a line to Mammoth Cave, as commonly reported.

McKeesport, Pa.—The Port Vue Traction Co. has been granted a charter to build two miles of road. President, Charles Biggs. Directors, Peter Leuckert and James A. Little, McKeesport; John W. White, Blair, Pa. The capital stock is $12,000. The route makes a complete circuit over the streets of McKeesport and connects with the tracks of the McKeesport & Reynoldton Passenger Railway Co.

Newport, R. I.—The council of Portsmouth this afternoon granted the Middletown & Portsmouth Street Railway Co. permission to lay tracks through that town. Middletown will take action Dec. 20, and if favorable action is taken the road between Newport and Fall River will probably be built early in the spring.

New York.—The New York & North Shore Railroad Co has filed a certificate of extension for its route. It is proposed to build branches over some of the streets in Whitestone, Flushing and Jamaica.

Norfolk, Va.—The new owners of the Norfolk Street Railway Co. have elected the following officers: R. L. Williams, Richmond, President; F. O. Briggs, Trenton, N. J., Vice-President; W. H. Doyle, Norfolk, Treasurer; and H. C. Whitehead, Norfolk, Secretary and Auditor. The directors include J. W. Middendorf, Baltimore, Vice-President of the Georgia & Alabama Railroad; Robert C. Davidson, Baltimore; C. R. Spence, Baltimore; W. M. Habliston, Petersburg, and R. B. Cook, Norfolk.

Norwalk, O.—W. W. Graham, of Norwalk, and Clark Rude, of Sandusky, who hold a franchise to build an electric railroad from Norwalk to Sandusky through Monroeville, have been granted an extension of time to Jan. 1, 1899, by the Commissioners of Hume and Erie Counties.

Oil City, Pa.—The Citizens' Traction Co., which was recently organized, proposes to build its line to Titusville and Franklin. An electric line is also proposed from Titusville to Cambridge Springs, Meadville and Erie, over the Titusville and Cambridge right of way.

Omaha, Neb.—Mr. R. C. Hannan states that it will probably be two months before the work of building the Mamana extension is begun. The new road will run to the Exposition grounds, and traffic arrangements will be made with the other street railroad companies by which the new line can make connections with the present electric roads in the city.

Quakertown, Penn.—A preliminary survey has been made and the right of way is being secured for an extension of the electric road between Quakertown and Rushland north to Hellertown, where it will intersect with the line connecting with Bethlehem.

Reynoldton, Pa.—Reynoldton Traction Co. has been granted a charter to build a line three miles long. President, J. W. White, Blair, Pa.; Directors, H. B. Rinehart, John E. Little, James A. Little, Charles Briggs, all of McKeesport. The capital stock is $18,000. The proposed route is from Camden station, on the Pittsburgh, Virginia & Charleston Railroad, to McKeesport.

St. Louis, Mo.—The Town Board of Winstanley Park granted the Bellville & St. Louis Electric Railroad Co. a franchise to pass through certain streets of Winstanley Park. The road known as the Day Line has also secured a franchise from the same village. The Belleville & St. Louis electric road has received ties and other supplies with which to begin construction of the line. The length, as proposed, will be seven miles.

St. Thomas, Ont.—The by-laws to confirm an agreement between the City Council and street railroad company for changing the motive power of the street railroad to electricity has been carried by the ratepayers. The company proposes to build 6¼ miles of track.

Sherbrooke, Que.—The Sherbrooke Electric Railway Co. will extend the line to Little Niagog Lake next summer.

Spokane, Wash.—At a meeting of the recently organized Meyer's Falls & Fort Spokane Navigation Co., the following officers were elected: President, A. J. Ross; Vice President, Dr. J. E. Gandy; Treasurer, S. T. Arthur; Secretary, E. J. Dyer. The company proposes to build an electric road from Meyer's Falls, nine miles, to the Columbia River, which they will connect with Fort Spokane by boats. Construction work will probably be begun in the spring.

Washington, D. C.—A bill authorizing the Anacostia & Potomac River Railway Co. of the District of Columbia to change its motive power to electricity, to be operated by the electric conduit system, has been introduced in the Senate. The change is to be made within one year after the approval of the act.

Williamstown, Pa.—An ordinance granting the Lykens and Williams Valley Electric Railway Co. a right of way has been introduced in the Council.

Youngstown, O.—There is talk of extending the tracks of the Youngstown Street Railway Co. to Hubbard and Sharon, Pa.

GENERAL RAILROAD NEWS.

Altoona & Beach Creek.—This road has been purchased by Samuel P. Langdon, of Philadelphia, for the Pittsburgh, Johnstown, Ebensburg & Eastern, the sale being completed last week. The Altoona & Beech Creek is the successor of the Altoona, Clearfield & Northern, sold on Feb. 6 last, and is to become a part of the newly projected Pittsburgh, Johnstown, Ebensburg & Eastern, which is to run from Johnstown, Pa., on the Baltimore & Ohio, east about 60 miles to a point on the Altoona & Beech Creek. The Altoona & Beech Creek extends from Juniata to Dougherty, Pa., 13 miles.

Atchison, Topeka & Santa Fe.—Aldace F. Walker, Chairman of the Board of Directors, makes the following statement: "For the past six months the Atchison has operated under a lease with option to purchase the Silver City & Northwestern, a branch line 15 miles long running from Whitewater, N. Mex., to mining districts. A good deal of mining ore has been developed and Atchison has now decided to complete the purchase of the branch."

Atlanta & West Point.—The petition of Levi Nelson for the appointment of a Receiver for this road has been denied by the Court. The petition was made on the ground that the charter granted in December, 1866, had expired by its limitation of 30 years. The petition, which was made in December, 1896, was refused by Judge Lumpkin, of the Superior Court. (See this column for March 19.) In the recent trial the jury finds that the Act of Legislature in extending the charter for 50 years was constitutional and the injunction against the company was dissolved.

Baltimore & Ohio Southwestern.—The earnings for September and for the three months ended Sept. 30 were reported as follows:

	1897.	1896.	Inc.
September:			
Gross earn.	$595,180	$525,562	$69,618
Oper. expen.	385,195	346,680	38,515
Net earn.	$209,985	$178,882	$31,103
Five months:			
Gross earn.	$1,721,835	$1,563,620	$158,215
Oper. expen.	1,169,063	1,067,938	101,125
Net earn.	$552,772	$495,682	$57,090

Cape Fear & Yadkin Valley.—It is announced that the proposition made by the Seaboard Air Line has been accepted, and the Cape Fear & Yadkin Valley will hereafter be operated by that road, to which it will be leased in perpetuity. The road extends from Wilmington, N. C., to Mount Airy, 248 miles, with several branches. The Seaboard Air Line guarantees the bonds, agrees to operate the road for 75 per cent. of the gross receipts, to maintain the equipment of the road in good condition, and to permit the use of any surplus of the 25 per cent. allowed for rental as dividend on the preferred stock.

Central Pacific.—At the request of the holders of a large number of shares and of the members of the London Committee, of which F. G. Banbury, M. P., is Chairman, Messrs. August Belmont, John G. Carlisle and George Coppell have undertaken to act as a committee to prepare a plan of reorganization. Holders of stock are requested to deposit their shares with the Central Trust Company, for which they will receive negotiable receipts. The plan of action contemplates: 1. An equitable settlement with the United States government respecting the government's men on the aided portions of the road. 2. Avoiding, if possible, the expenses attendant upon the receivership. 3. A reorganization under which a new issue of bonds may be made at the lowest possible rate of interest.

Chattanooga & Southern.—Holders of Central Trust Company certificates of deposit for the Chattanooga, Rome & Columbus first mortgage five per cent. bonds can exchange these certificates for new securities in accordance with the plans of reorganization upon presentation at the office of Simon Borg & Co., New York.

Cumberland & Ohio.—The sale of the Northern Division of this road, announced in this column on Dec. 3, took place at Louisville, Ky., on Dec. 13. It was bought by the Southern for $1,000, but subject to liens of $600,000, of which $250,000 are in bonds and $350,000 in receiver's certificates. This division extends from Shelbyville, Ky., southwest 26.7 miles to Bloomfield, and is operated by the Louisville & Nashville.

Excelsior Springs.—This road will be sold under foreclosure at the Court House in Liberty, Mo., Dec. 20, between the hours of 10 a. m. and 2 p. m. by special master H. F. Simrall. It is expected that the company recently organized to represent the bondholders will bid in the road. The line extends from Excelsior Springs, Mo., to Excelsior Springs Junction, a point on the Wabash, 9.47 miles.

Genesee & Wyoming Valley.—This company has defaulted in interest payments on its $500,000 first mortgage six per cent., due Dec. 1, but hopes to make payment on Dec. 31. F. J. Lisman, 30 Broad street, New York, requests the holders of these bonds to communicate with him. At an auction sale on Dec. 24 $17,000 of these bonds were bought by the President of the company, Reon Barnes, of New York. The road was projected to run from Perry, N. Y., to Caledonia, 20.71 miles, of which 10.66 miles, from Retso, N. Y., to Pittsburgh and Lehigh Junction, have been completed, besides the purchase from Retso to Greigsville, 3.73 miles.

Georgia Southern & Florida.—It is reported that the remaining $600,000 five per cent. bonds, which have been held by a pool for some years, have been sold at about 99½, and the pool has been dissolved. The pool was originally organized to take over about $2,300,000 of these bonds at the time of the purchase of the road by the Southern, all of which had been previously disposed of with the exception of the $600,000 now sold.

Illinois Central.—The earnings for the four months ended Oct. 31 are as follows:

	1897.	1896.	Inc.
Four months:			
Gross earn.	$8,945,318	$7,443,161	$1,502,187
Oper. expen.	6,340,385	5,289,933	1,050,452
Net earn.	$2,604,963	$2,153,228	$451,735

Kansas City, Watkins & Gulf.—The Farmers Loan & Trust Co. of New York have filed a suit in the United States Circuit Court at Shreveport, La., against this company in behalf of bondholders, in which they ask that the railroad be placed in the hands of a Receiver. The motion was heard before Judge Aleck Boarman on Dec. 11, and a postponement was taken for about two weeks before the same judge. The reorganization committee of the road are Alexander & Green, 120 Broadway, New York, and Strong, Holmes & Matthews, 45 William street, New York. The road extends from Alexandria, La., 93.37 miles, to Lake Charles.

Kansas Pacific.—Senator Gear, of Iowa, introduced a bill in the Senate Dec. 8 authorizing the Secretary of the Treasury to enter a bid for the United States on bond-aided roads, the bill having particular reference to the Kansas Pacific sale, as requested by President McKinley in his annual message, referred to in this column last week. The provision is as follows: The Secretary of the Treasury shall, under direction of the President, redeem or otherwise clear off such paramount lien or mortgage, or other encumbrance, by paying the sum lawfully due in respect thereof out of the Treasury; or may bid and purchase in the name and for the United States the property affected by and subject to such paramount lien at any sale thereof made under any order of the Court or any judgment or decree of foreclosure of such lien or interest of the United States.

Judge Sanborn, of the United States Circuit Court, sitting at St. Louis, Mo., Dec. 13, granted a postponement of 60 days of the order of sale of the Kansas Pacific, making the new date Feb. 15.

Lake Shore & Michigan Southern.—A large force of men on Dec. 5 was put to work to pull up the tracks of that portion of the Dundee branch not included in the sale to the Detroit & Lima Northern. (See these columns for Dec. 3.) The tracks removed are the side tracks, switches and part of the Y as far as Corbus, Mich., two miles west of Dundee, where this branch has formed a junction with the Adrian & Monroe branch.

Lehigh Coal & Navigation Co.—This company gives notice that the $2,810,000 of its gold loan, maturing Dec. 15, will be paid off on that day. Of this amount, $2,310,000 was assumed by the Central of New Jersey in consideration of the sale of the railroad equipment of the Lehigh & Susquehanna at the time of the lease of that road in 1871, and $500,000 was assumed by the Lehigh & Wilkes-Barre Coal Co. as part of the purchase money of certain coal lands. These companies now supply the funds to extinguish this indebtedness.

Little Rock & Memphis.—The foreclosure sale fixed for Dec. 11 has been again postponed to March 3. The sale of this road has been postponed a number of times during the last two years.

Memphis & Charleston.—The Borg Committee has called a meeting of the holders of Central Trust Company certificates of general mortgage bonds of this company, to be held Dec. 24, for the purpose of ratifying a agreement made by the committee in behalf of these certificate holders. The terms of the agreement will not be given out until after that date.

Mexican National.—The earnings for October and for the ten months ended Oct. 31 were reported as follows:

October.	1897.	1896.	Inc. or Dec.
Gross earn	$525,213	$490,225	I. $34 988
Oper. expen	422,640	365,230	I. 57,410
Net earn	$102,573	$124,995	D. $22,422
Ten months:			
Gross earn	$4,986,859	$4,251.742	I $735,117
Oper. expen.	3,802,049	3,153,746	I. 648,303
Net earn	$1,184,810	$1,097,996	I. $86,814

Minneapolis, St. Paul & Sault Ste. Marie.—The earnings for October and the 10 months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$479,072	$443,951	I. $35,121
Oper expen	207,493	216,443	D. 8,950
Net earn	$271,579	$227,508	I. $44,071
Ten months:			
Gross earn	$3,128,802	$3.095,407	I. $33,395
Oper. expen	1,818,792	1,812,075	I. 6.717
Net earn	$1,310,010	$1,283,332	I. $26,678

Newfoundland Road.—The Northern & Western Government Railway, whose completion was noted in this column Oct. 22, is to be opened in March next. It extends from St. John's, the capital, on the east coast, to Port au Basques on the southwest extremity of the island, and is a 3 ft. 6 in. gage line, 547 miles long, with three branches 29, 26 and 13 miles respectively. The cost is estimated at £1,900,000. As the work was done by the government and the cost stands as a public debt, it is a serious burden to the Newfoundlanders, who only number 200,000 all told. This railroad debt is one half the entire public debt of the colony. For the next seven years the government is not to be directly concerned in the working of the line, as the contractor who built it will operate it for that period.

Norfolk & Western.—W. H. Newbolds, Son & Co., of Philadelphia, have an agreement with this company to extend the Southside consolidated mortgage third preferred six per cent. bonds ($100,000 outstanding), maturing Jan. 1, 1898, until July 1, 1900, the extension bonds to bear interest at 4½ per cent. per annum, payable in gold. The holders of these bonds who desire such extension must make application prior to Dec. 31 paying the premium of one-half of one per cent. After Jan. 1 the bonds will be purchased at par.

Ogdensburgh & Lake Champlain.—Charles Parsons Receiver, gives notice that he will pay at any time after Dec. 15 at the office of the Central Trust Co., of New York, an amount equal to three per cent. of the par value of each first mortgage bond upon presentation of the same with the coupon due Oct., 1896.

Oregon Railroad & Navigation Co.—Following Dec. 17 the rate of conversion of the first mortgage six per cent. bonds of the old Oregon Railway & Navigation Co. into the four per cent. consols of new company will be changed from $1,225 to $1,210 for each $1,000 bond.

Sealed proposals will be received at the office of The Farmers' Loan & Trust Co., New York, for the sale of the Trustees of 137 first mortgage bonds of the old Oregon Railway & Navigation Co. for the sinking fund, as provided in the mortgage of Dec. 1, 1880. The proposals must be presented before noon, Dec. 31.

Oregon Short Line.—The earnings for October and for the four months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$588,858	$570,010	I. $18,848
Oper. expen	355,834	315,852	I. 39,982
Net earn	$233,024	$254,158	D. $21,134
Four months:			
Gross earn	$2,184.204	$2,020,172	I. $164,032
Oper. expen	1,323.339	1,394,202	D. 70 863
Net earn	$860,865	$625,970	I. $93,169

Philadelphia & Erie.—The earnings for October and for the ten months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$538,061	$527,561	I. $10,500
Oper. expen	346,006	323,557	I. 22,449
Net earn	$192,055	$204,004	D. $11,949
Ten months:			
Gross earn	$3,758,891	$3,684,581	I. $74,310
Oper. expen	2,641.473	2,632,219	I. 9,254
Net earn	$1,117,418	$1,052,362	I. $65,056

Sandusky, Mansfield & Newark.—Holders of the bonds ($2,300,000 outstanding) of this leased line of the Baltimore & Ohio are notified that the coupons which matured Jan. 1, 1897, would be paid at any time after Dec 15, with interest at five per cent. from maturity, the equivalent being $36.68 for each coupon.

Southern.—Holders of equipment mortgage bonds of the Richmond & Danville line of the Southern are notified that 43 of these bonds will be drawn for payment at par from the sinking fund at the office of the Central Trust Co., New York, on or before March 1, 1898.

Union Pacific.—The earnings, for the entire system, for October and for the 10 months ended October 31 were as follows:

October:	1897.	1896.	Inc.
Gross earn	$2,111,086	$1,930,832	$180,234
Oper. expen	1,193,938	1,042.852	151,086
Net earn	$917,128	$887,980	$29,148
Ten months:			
Gross earn	$15,703,334	$13,5 5,722	$2,177,612
Oper. expen	10,029,885	8,737.173	1,292,711
Net earn	$5,673,449	$4,788,549	$881,901

Secretary Gage has issued a public notice in regard to the Union Pacific that on Dec. 24 the Treasury Department will be prepared to begin redemption without rebate on interest, of the currency bonds maturing Jan. 1, 1898, and that checks will be mailed on that date in payment of principal and interest of all bonds presented before that time. There is $29,904,952 of these bonds outstanding, of which $15,919.512 was issued for the Union Pacific, $1,423,000 for the Kansas Pacific, $320,000 for the Central Branch of the Union Pacific, $1,628,320 for the Sioux City and Pacific, besides $10,614,120 in aid of the Central Pacific.

Electric Railroad News.

Chicago.—A suit for $50,000 damages against the Union Loop company has been filed in the United States Circuit Court. The complainant claims that a seven-story building, valued at $250,000, has greatly depreciated since the loop was completed.

Springfield, Mass.—Press reports state that application has been made for a trustee for the Springfield & Southwestern Electric Railroad Co., which has been building a road from the Massachusetts state line to Suffield, Conn. The application for a trustee is based on an unsatisfied claim for payment for railroad ties.

Millford, Mass.—The Millford, Holstein & Framingham Electric Railway Co. has filed a petition with the Railroad Commissioners for permission to issue $180,000 bonds.

TRAFFIC.

Traffic Notes.

Freight shipped from New York Nov. 20 by the Morgan steamships and the Southern Pacific Railroad, was received at San Francisco in 9⅛ days from the time it started.

It is reported that the new Armour grain elevator, built at Buffalo a year ago, has handled 20 million bushels of grain during the past season, and the vessel-men estimate that the income has about paid for the building.

The new steamship Miami, of the Florida East Coast Railway, will begin regular trips between Miami, Fla., and the Bahama Islands on Jan. 17. For the first four weeks trips will be made semi-weekly, and after that tri-weekly.

The Directors of the Boston Merchants' Association, at a recent meeting, passed a resolution declaring that the opinion of Attorney-General McKenna, construing Section 22 of the present tariff law as not prohibiting the importation of goods through Canada, ought to be the fixed law of the land.

The Pennsylvania Railroad, which, it appears, has from time immemorial carried newspapers in baggage cars free, has notified publishers that hereafter a charge will be made. The rate is 40 cents per 100 lbs. for 100 miles or less; 50 cents for over 100 miles, and $1 to points beyond Pittsburgh.

Sixteen platforms or stations for facilitating the loading of milk have been recently built at stations along the line of the Lebanon Valley Division of the Philadelphia & Reading, and it is said that the business of shipping milk from this region to both Philadelphia and New York is to be materially enlarged.

The Burlington has announced that in Nebraska it will change its livestock rates from cents per hundred pounds back to dollars per carload. The Missouri Pacific immediately followed with a similar announcement. It had been supposed that all the roads would ignore the Commissioners' recent order.

The New York and Florida fast train over the Atlantic Coast Line will begin running on Jan. 17, and run every day during the season, except Sundays. The time from New York to Jacksonville will be less than 26 hours. The time of the through Florida trains from Cincinnati and from Louisville has also been shortened.

The officers of the Seaboard Air Line and of the Southern Railway announce that the long-standing differences between these companies concerning rates to and from Baltimore have been settled, the agreement including arrangements for all steamboat and railroad rates on the lines of both companies. It is understood that the Richmond service will be abandoned by the Baltimore Steam Packet Company (Seaboard Air Line) and that the York River Line (Southern Railway) will cease to be a competitor for Norfolk business.

The long pending suits of the Grain Dealers' Association of Northwestern Iowa against the Chicago, Milwaukee & St. Paul for alleged overcharges on grain, which was transported five or six years ago, have been settled out of court. Similar cases are pending against other roads, involving, according to local papers, about $1,500,000 in alleged overcharges. The basis of the prsent settlement is not given. The pretext for the suits was an opinion of the Interstate Commerce Commission, issued in 1890, to the effect that the rates charged by the railroads were excessive.

Some Benefit from Car Shortage.

A car famine, such as has been experienced in Arkansas, is not a pleasant thing, and yet there are some compensations. The inability of the manufacturers to make shipments promptly has prevented lumber dealers in the West from stocking up, and there will be a sprinkling of rush orders all through the winter. The theory is advanced by some people that a good deal of alleged car shortage is attributable to the scarcity of motive power rather than of cars. It appears that some roads are well supplied with locomotives while others have an insufficient number. The latter is said to be the case with some of the roads in the southwest where the car famine has been most pronounced.—*The Timberman.*

Twenty Fines, $10,000.

In the Fifty-third District Court at Austin yesterday, Attorney-General Crane filed 20 penalty suits against the International & Great Northern Railway, alleging violation of the Railroad Commission's tariffs and charging that the railway company had, on various and sundry occasions, discriminated in favor of the National Cotton Oil Company, and T. F. Smith, of Houston, and Jones & Smith, of Crockett, in the transportation of cotton seed. The defendant, through its attorney, M. A. Steadman, pleaded guilty and judgment for $500 penalty was entered for the State in each case, the aggregate amount assessed being $10,000, which was immediately paid. As in the Southern Pacific cases, the Attorney-General agrees to hold in suspense the other charges against the defendant company provided it makes no further attempt to evade the Commission law. Other cases against other lines will be filed soon.—*Houston (Tex.) Post*, Dec. 9.

Close of Lake Navigation.

With the expiration of regular insurance, at noon Dec. 12, the lake marine season closed. The records for the locks at Sault Ste. Marie show that about 18,000,000 tons of freight passed through during the season. The aggregate of freight carried on the lakes, exclusive of local traffic on Lake Ontario, was between 45,000,000 and 50,000,000 tons. The output of iron ore for this year from the Lake Superior mines was about 12,000,000 tons, a large increase over a few years ago when 5,000,000 or 6,000,000 tons was considered remarkable. This year iron ore has moved steadily for eight months. Hard coal has moved in slightly larger quantity than last year. Soft coal shipments from Ohio ports were interrupted by the strike of last summer, but with the rush of shipments during the last few weeks the shortage in the Northwest is not large. Lumber has moved in larger quantities than last season, Chicago being about 500 million feet ahead of its receipts for 1896. There is a material falling off in wheat shipments, owing to the short crop; but corn and oats from Chicago more than supplied the deficiency. For weeks at a time Chicago shipped over 7,000,000 bushels of grain a week, and it is expected that the Board of Trade Report will show that the grain trade of Chicago has been greater than ever before. Freight rates for the season have, however, been extremely low, and at times the charge for carrying a bushel of corn from Chicago to Buffalo went to ⅛ of a cent, while the one-cent rate held for some weeks. Low rates have put a check on the construction of new vessels, although 14 general freighters are now under construction at lake shipyards. On Dec. 15 a meeting was held at Cleveland by vessel-owners to prepare a plan by which carrying charges may be controlled next year. The question of how to compete with vessels of the great size which are now coming into general use, is a troublesome one to owners of vessels of 2,000 and 3,000 tons.

Chicago Traffic Matters.

CHICAGO, Dec. 15, 1897.

There is considerable friction among the lines in the Central Passenger Association over the use of the new interchangeable mileage ticket in Michigan. To forestall adverse legislation in that state the roads running through it have asked that the ticket be made acceptable on trains; and immediately the Ohio lines made a similar request. The matter has been referred to the presidents.

The Eastern lines have extended their clergy-ticket agreement for the year 1898 so that it will include Iowa, Wisconsin, Kentucky, Missouri and West Virginia.

Western lines voted down the proposition for the establishment of a bureau through which all commissions on passenger business were to be paid.

With the spring timetable it is stated that the Erie road will shorten the running time between Chicago and New York, so that it will be taken out of the differential class.

Chicago wholesale merchants have been granted a reduced rate of a fare and one-fifth for the round trip for the spring meeting of the National Association of Merchants and Travelers in Chicago, by the Central Passenger Association roads. For previous meetings the rate has been a fare and one third. The same Association has granted to the Society of Christian Endeavor a rate of one fare for the round trip for next summer's meeting at Nashville.

The Eastbound freight situation remains in a chaotic state. Grain and provision rates are being slashed right and left and no efforts are made by any of the companies to live up to the tariffs. It is said that large quantities of corn for New York have been taken at 15 cents, and even provisions at the same price. On the Board of Trade there is an apparently well-founded report that wheat amounting to five million bushels has been contracted to New York at 12 cents per 100 lbs. Lake navigation has closed and all the roads are getting large quantities of grain, but there is no pretense of a settled rate.

The rise in the price of wheat has produced great activity in the freight department of the roads from the Northwest and empty cars are being sent westward as fast as possible. Receipts of wheat here last week were 1,300,000 bushels, very much larger than usual at this season. All of the roads from the West and Southwest are now enjoying a heavy freight movement, though a part of the tonnage is Colorado freight, which is being carried at very low rates.

The Chicago and St. Paul lines have rejected the propositions of the Eastern roads regarding a division of through rates on grain and flour from St. Paul and Minneapolis to New York. The Eastern roads demanded the deduction of three cents per 100 lbs. for lighterage charges at New York before pro-rating, and this the Northwestern roads would not stand.

The Rock Island road last week served notice on the Southwestern Passenger Association that after Dec. 15 it would no longer stand its share of the cost of maintaining that organization, and would withdraw, seeing no hope of a settlement of passenger disputes in the Southwest.

If present indications count for anything, freight rates between Chicago and Colorado are to drop still lower. The Union Pacific, Denver & Gulf road refuses to submit the trouble to arbitration, and the Burlington has given it out that it proposes to force the fighting even if it has to carry freight free to head off competition via the water routes from New York.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the western termini of the trunk lines for the week ending Dec. 9 amounted to 79,292 tons, as compared with 70,514 tons the preceding week. This statement includes 31,593 tons of grain, 3,847 tons of flour and 17,562 tons of provisions, but not livestock. The following is the statement in detail for the two weeks:

Roads.	Week Ending Dec. 9.		Week Ending Dec. 2.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	5,459	6 9	5,606	7.9
C., C., C. & St. Louis	5,602	7 1	3 713	5 3
Erie	9,188	11.6	7,754	11
Grand Trunk	4,141	5.2	4,438	6 3
L. S. & M. S.	8,614	10.9	7,067	10
Michigan Central	10,467	13 2	7,255	10 3
N. Y., Chi. & St. L.	5,601	7 1	5,262	7.4
Pitts., Cin., Chi. & St. Louis	9,303	11.7	9,218	13 1
Pitts., Ft. Wayne & Chicago	13,029	16.4	14,512	20 6
Wabash	7,888	9.9	5,689	8.1
Totals	79,292	100.0	70,514	100.0

Lake shipments last week were 104,697 tons.